

1995 Interim Report

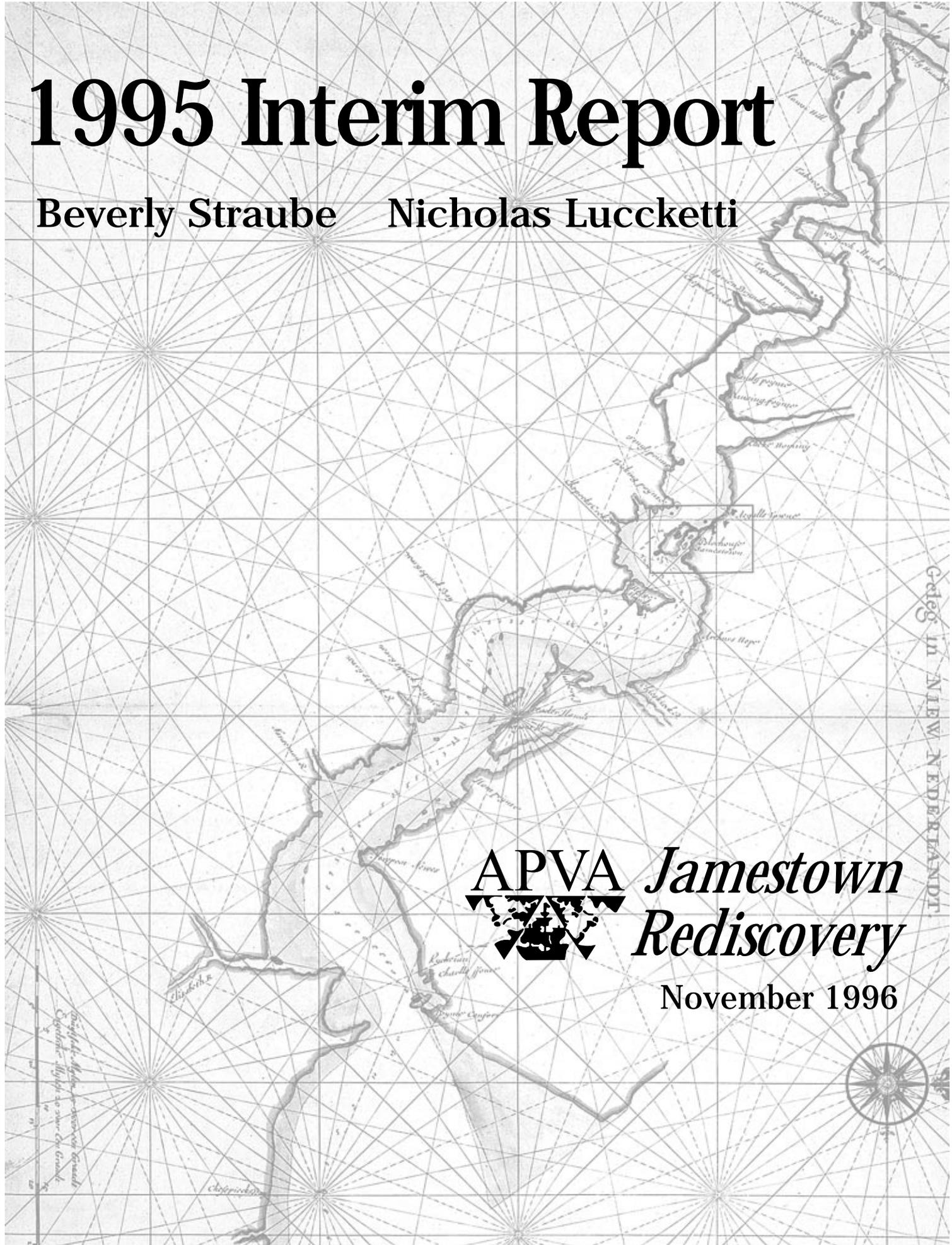
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APVA  *Jamestown
Rediscovery*

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Geleg in NIEUW NEDERLANDT



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INTRODUCTION

Background

The year 1995 was the second year of the APVA's *Jamestown Rediscovery*, an archaeological program devoted to discovering and understanding the early seventeenth-century settlement on the APVA's 22 1/2 acres on Jamestown Island. The 1995 field report is the second annual report on the archaeological work. It covers work conducted from March through December 1995 that 1) continued the investigation of features unearthed in 1994 and, 2) expanded the original excavation area in two directions.

The 1994 field season, which lasted from April through December, investigated an area approximately 40' square between the Jamestown Church and the James River. The excavation uncovered a 23'-long section of a slot trench that contained postmolds set side-by-side, a 12' by 9' pit, three overlapping ditches that postdate the slot trench and pit, and about a dozen postmolds and/or postholes. The slot trench is believed to be a palisade for one of the first forts constructed at Jamestown. Partial excavation of the large pit yielded a very large quantity of artifacts that contained evidence of glassmaking, the manufacture of copper ornaments that probably were used in trade with the Indians, and many military-related objects, including a complete cabasset helmet, numerous pieces of armor, matchlocks, gun rests, and edged weapons. The ceramics, dated coins, cloth seals, jettons, and other artifacts from the site suggest that it was occupied during the first few years of English settlement at Jamestown Island.

Acknowledgments

The *Jamestown Rediscovery* staff was increased in 1995 by the addition of two more full-time field archaeologists, Eric Deetz and Patricia Sternheimer. The excavations were supplemented by an APVA Summer Institute in Historical Archaeology which comprised ten teachers for 6

weeks. Visiting Senior Archaeologists David K. Hazzard, Alain C. Outlaw, Eric C. Klingelhofer, and Carter L. Hudgins rotated through the Summer Institute to provide additional supervision of the students. Also contributing to the fieldwork was an eight-week history class from the College of William and Mary which consisted of five American History or American Studies doctoral students with several years of archaeological experience on Virginia colonial sites. Professional archaeologists and *Jamestown Rediscovery* Advisory Board members Alaric Faulkner and Martha Williams each volunteered a week of their time on the excavation, while interns Mike Westfall, Pat Valko, Joanne Robbins, Jane Caputo, and Danny Schmidt made substantial contributions both in the field and in the laboratory.

Several other scholars generously assisted *Jamestown Rediscovery* in 1995. The artifact collection was studied by Museum of London archaeologist Geoff Egan, who also worked in the field. E. Randolph Turner, a prehistoric archaeologist with the Virginia Department of Historic Resources, conducted a basic analysis of the Native American ceramic types recovered during the current project. The site, since it is a tightly dated and short-lived context, represents a time capsule for the material culture of protohistoric and early contact periods. As always, Colonial Williamsburg Foundation architectural historians Willie Graham and Cary Carson cheerfully reviewed the architectural evidence and offered suggestions on the nature of structures uncovered by *Jamestown Rediscovery*. Drs. Jerre Johnson and Stephen Clement of the geology department at the College of William and Mary continued to freely dispense their wisdom, identifying geological specimens recovered from the excavation. Also, Fraser D. Neiman, Director of Archaeology at Monticello, was always willing to provide advice on plowzone artifact and soil chemical analyses.

Several special scientific studies of Pit I were conducted during 1995, including parasitological analysis by Leslie H. Driscoll, seed analysis by Dr.

Steven Mrozowski, pollen analysis by Dr. Gerald Kelso, and microstratigraphic analysis by Doug Curry. Dr. Stuart Fleming of the University of Pennsylvania Museum performed a metallurgical analysis of several copper objects recovered from the excavation. NASA and Bob Berry continued their significant donations of time and use of equipment for radiography of iron artifacts. Patricia Sternheimer also conducted preliminary sorting and identification of the faunal remains.

Tents to cover the site were obtained through a matching grant from the Marietta McNeill Morgan and Samuel Tate Morgan, Jr., Foundation of Richmond. Funding for the 1995 field season was provided by the APVA, the Virginia General Assembly, and the National Endowment for the Humanities. The Summer Institute was made possible by a grant from the Jessie Ball DuPont Fund.

Aerial view of the Jamestown site at the end of the 1995 season.



1995 Excavations

Research Design

A composite archaeological site plan incorporating the features discovered in 1994 by *Jamestown Rediscovery* and a narrow ditch and four postholes found in 1949 by J.C. Harrington immediately west of the project area revealed that the 1994 slot trench corresponded precisely with Harrington's narrow ditch. Also, Harrington recorded three large postholes at 9 foot intervals at a break in the slot trench, suggesting the presence of a structure, possibly associated with the palisade. Accordingly, the 1995 field season expanded the original excavation to the west and northwest to completely expose the entire structure represented by Harrington's postholes and to determine why the palisade slot trench apparently stopped or ended at this point.

When it became clear that the slot trench was destroyed to the west, probably by construction of either the seawall and/or the Confederate Fort, the project shifted its focus to the east of the original excavation area. The palisade slot trench also was not evident east of the later ditch complex. Possible explanations were that the slot trench made a turn toward the James River, the

slot trench stopped because a non-palisade structure such as a watchtower or blockhouse once stood at this point, or the slot trench did not survive here due to a drop in grade. Consequently, the excavation area was expanded to the east in order to relocate the slot trench and to ascertain what caused the gap. Additionally, a sample of the slot trench was excavated in 1995.

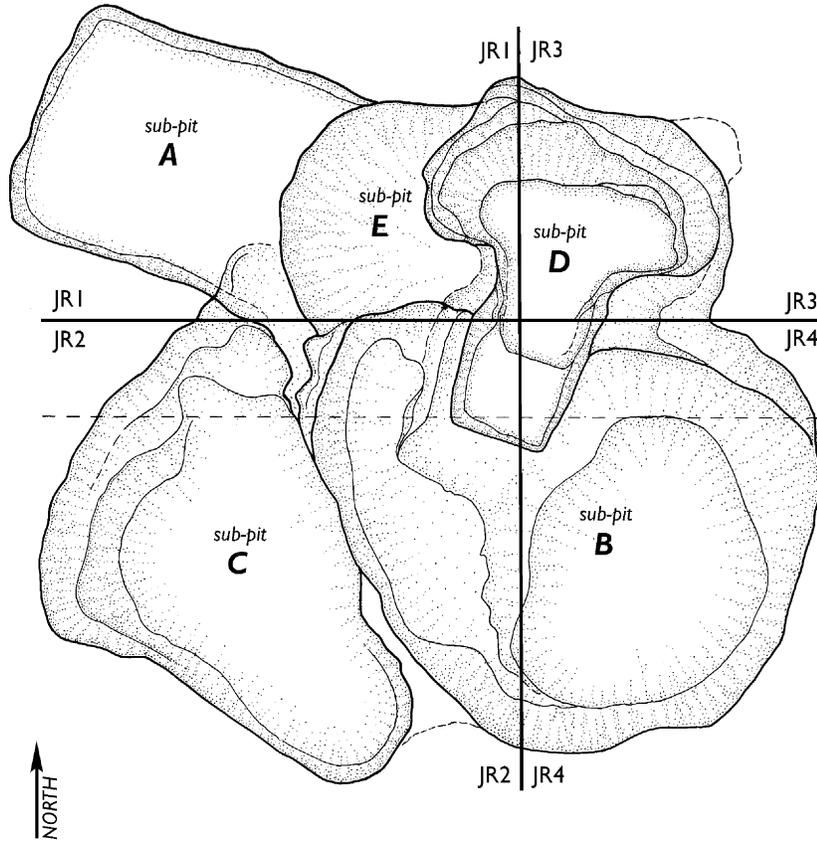
A total of 24 ten-foot squares and 5 five-by-ten-foot squares were excavated during the 1995 field season. A twentieth-century sand and gravel road through the site was removed with a Bobcat grader, all the plowzone was shoveled off and screened; and all feature excavation was hand troweled. Several special scientific studies were conducted in 1995 of the fill in Pit I, including pollen analysis (both column and spot), column seed analysis, parasite analysis, and microstratigraphic analysis.

The 1995 field season completed the excavation of features uncovered in 1994, namely Pit I, Pit II, the three ditches, and excavated sections of the palisade slot trench. The extension of the excavation to the west and northwest uncovered an earthfast structure, a continuation of the slot trench, a line of postholes parallel to the slot trench, and a shallow ditch or trench. The east ex-

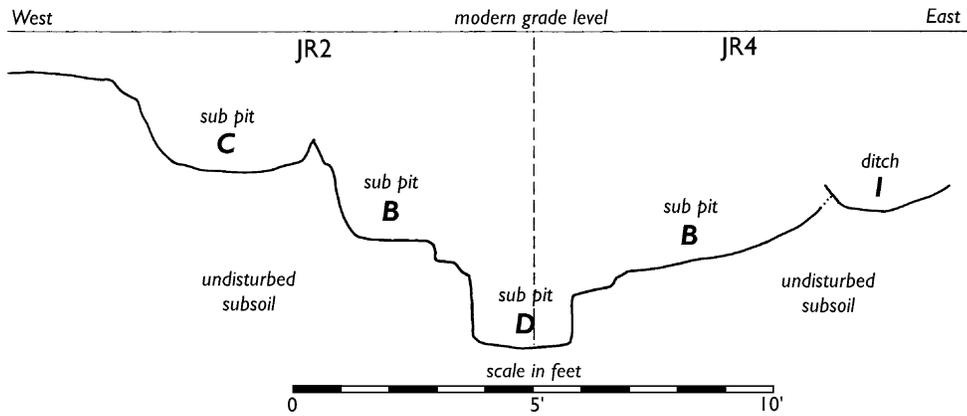


*Overhead view
of Pit I.*

Plan and contours of Pit I



PIT I CONTOURS - AT BALK , FACING NORTH



tension of the excavation located several large postholes, portions of 2 pits or wide ditches, and a curved section of slot trench.

Results

Pit I (JR1-4)

The excavation of Pit I, begun in 1994, was completed during the 1995 field season. The pit, with maximum dimensions of 20' by 16', was situated in four 10' squares and was excavated as four separate contexts, but not as four equal-sized quadrants. Pit I appeared to be created by at least five separate phases of digging.

Subpit A

This element of Pit I had a well-defined rectangular shape, suggesting it originally functioned as something other than a borrow pit. The straight side walls and flat bottom reflect careful construction and a form similar to storage pits or root cellars found on archaeological sites later in the seventeenth century.

Subpit A had three distinct episodes of filling. The three top layers in the pit (JR1J, 1V, 1AD) were all associated by the presence of sherds that mended to a large Roanoke simple-stamped pot. In addition, these layers also contained 5 pieces of copper scrap, 2 aglets, 4 upholstery tacks, 223 pieces of crown glass, a crucible fragment, and a chunk of stone with slag and glass drippings. Beneath these layers was a thick stratum of compact redeposited orange clay subsoil. This, in turn, covered three thin layers (JR1AA, 1AB, 1AC) that had only 17 artifacts, including iron shot for small artillery but no cullet, copper scrap, or Native American pottery.

Subpit B & C

Subpits B and C were filled variously with layers of clay wash or loam mixed with clay and were generally devoid of artifacts. The majority of the artifacts came from three upper layers. Just below the plowzone was a layer (JR2G) that was thick with cullet, composed of pieces of crown glass as evidenced by the numerous curved rim fragments and several bull's eyes. Below this was an ashy layer (JR2H) that produced many examples

of firearms, armor, and other weaponry, as well as drug jars and crucibles. A very thick layer of orange clay (JR2K), seemingly intentionally deposited, separated the artifact-rich ashy layer from a second similar stratum (JR4S) that contained more drug jar sherds and a large section of a Bartmann jug.

The two refuse-laden layers did not extend across Subpits B and C, but were concentrated along the east-west balk line. Subpit C was filled mainly with wash layers containing few European artifacts. It did, however, yield an intact cabasset helmet that was sitting upright in the ground.

Subpit D & E

Subpit D was the deepest part of Pit I, and its shape suggests it was intentionally cut for a particular, but as yet undetermined, purpose. The clay wash fill in Subpit D had two iron spade nosings and a hoe. The significance of Subpit E is that it clearly cut through the fill of Subpit A.

Overall

Pit I remains an enigmatic feature, although parts of it seem to be the product of digging for clay. There are a few things that are certain. Subpit A was the first component dug and filled, and then was cut by the digging of Subpits C and E. Also, Subpits B, C, and D were filled in at the same time.

Pit I may have been a well that subsequently eroded and then was used as a borrow pit for clay to make daub. Indeed, impressions of marsh reeds were found in the clay of Pit I, suggesting that daub was made in the pit, although it is possible that the reeds are from a thatch roof on nearby Structure I. Regardless of its function, Pit I dates to the first years of settlement. It had several closely datable artifacts: three coins from 1580-1602, four post 1586 casting counters, a 1570's lead token, and a lead cloth seal that could date no later than 1603.

Pit I: Parasitology Studies

Twelve samples from various strata in the pit were examined for evidence of human and/or domestic parasites. None of the samples yielded any recognizable parasite remains. Possible explanations of the results include: 1) the pit was not used as a privy or repository for human or animal waste; 2) the pit may have had waste material in it but there was insufficient infection of whipworm or

roundworm to leave a recoverable concentration of eggs; and, 3) fungus, bacteria, or other environmental conditions destroyed any eggs present in the pit (Driscoll).

Pit I: Pollen Studies

Two columns of soil were removed in 1" increments from two different quadrants in Pit I for pollen analysis. Numerous spot samples were also collected; generally, these were soil samples from beneath large artifacts. Preliminary analysis of one of the column samples indicates that there is very little pollen in the fill of Pit I (Gerald Kelso 1996, pers. comm.).

Pit I: Seed Studies

A 1'-square soil column was removed in 1" increments for seed analysis. In addition, 10–20 liters of soil were saved from loam and mixed fill layers in Pit I for flotation. Preliminary analysis of the soil column samples indicates that there are no seeds present in the fill of Pit I (Steven Mrozowski 1996, pers. comm.).

Pit I: Microstratigraphic Studies

A 1'-square soil column was removed from the same area as the seed analysis column for microstratigraphic analysis. The column was extracted by infusing it with epoxy and cutting it out after the adhesive was dry. Preliminary analysis in-

dicates that Pit I was not open for very long, perhaps only a few months, and was filled very quickly (Douglas Curry 1996, pers. comm.).

Pit I: Overview of Faunal Assemblage

The faunal material from Pit I initially was arranged into recognizable groups, such as fish, large mammals, small mammals, birds, etc., for preliminary identifications. A detailed faunal analysis is planned for the near future. No microfauna was studied at this time.

The overwhelming percentage of the total number of bones consisted of fish, with sturgeon comprising the greatest proportion of the remains. Gar, ray, shad, catfish, drumfish, and possibly perch, are present along with a few fragments of crab. There are at least four turtles in the collection: a loggerhead, a cooter, a box, and a musk turtle. Birds are represented by waterfowl and at least one turkey. A number of small mammals were identified, including beaver, squirrel, rodents, and a raccoon. The raccoon teeth were extremely worn, indicating it was of very advanced age which suggests that it was a pet, since wild raccoons are not long-lived. The assemblage contains a few leg fragments and part of a mandible from at least one deer. A small number of pig bones, elements of either a sheep or goat, and possibly a cow, exhibit butchery marks suggesting barreled meat. One horse is also represented.

Profile of Pit I and ditches showing the pit to left center.





The palisade line with excavated post molds.

Palisade Slot Trench (JR60-65) and Buttress Postholes (JR66)

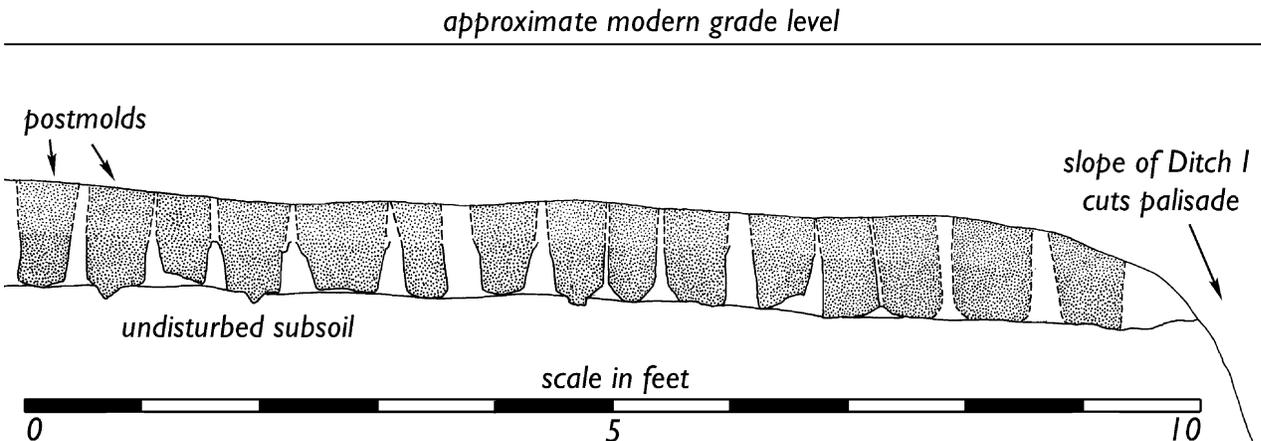
A palisade slot trench was uncovered for a distance of slightly more than 50'. The slot trench vanished on the west, where it was carved away by either the seawall construction or the borrowing of material to build the Confederate Fort. It is unclear why the slot trench stops to the east. It may have been obliterated by later ditches that cut through it; or perhaps the terminus was intentional and reflects the position of a gate or structure. There are numerous references indicating that the fort had blockhouse(s) and/or watchtower(s) that presumably were not of palisade/puncheon construction, but were hole-set buildings like Structure I with 8'-10' intervals between the support posts.

Twenty feet of the palisade were completely excavated (JR60 and JR61), separating the postmolds from the trench backfill, while another 20' (JR63 and JR64) were taken down 2" to enhance the postmold definition for mapping. A six-foot section of the palisade with excavated postmolds was documented by making a concrete cast.

The timbers in the palisade were set on the bottom of the slot trench. There was no evidence that they were driven, although there were several small indentations in the bottom of the trench

Profile of section of palisade line.

PALISADE SECTION JR 60 (facing North)





One of the buttress posts supporting the palisade.

(Figure 3, section along trench). The indentations, about 1"-1.5" in diameter and about the same depth, appear to be the points at the bottoms of trees that had been cut down with an ax. The slot trench was rectangular with vertical sides and flat bottom with an average width of one foot. The postmolds were not squares or rectangles, but slightly irregular ovals, circles, triangles, or trapazoids. There was at least one postmold that appeared as a well-defined half-circle. They typically measured in the range of 6"-by-6" to 6"-by-9". There were a few larger postmolds that had dimensions of 6"-9"-by-12". On average, there are 16 postmolds per 10' section of palisade. No traces of wood were found, nor was there any evidence of burning.

Artifacts recovered during the excavation of the palisade provide solid evidence of its early construction. The slot trench backfill around the postmolds contained very few artifacts and those were either stone flakes or small sherds of Native American pottery. Only three European artifacts were found in the excavated section of the palisade; a Nueva Cadiz glass trade bead, a Hanns Krauwinkel (post 1586) casting counter, and the lockplate of a late sixteenth-century Scottish snaphaunce pistol. All three artifacts were recovered from postmolds. Thus, the absence of European artifacts in the slot trench construction backfill and the presence of three European artifacts in the slot trench postmolds, indicates the palisade was erected prior to any extensive settlement of the site and may be part of the first fort. Further testament to its early vintage is the presence of the nearby artifact rich Pit I which contained over 30,000 artifacts. The plowzone over and around Pit I contained an estimated additional 30,000 artifacts. The fact that none of this material, which was widespread in the plowzone over and around Pit I, was found either in the slot trench backfill or around the postmolds indicates that the palisade was constructed before Pit I was filled.

The palisade was strengthened by buttress posts. The buttress postholes were distinguishable from other structural postholes by their placement

Curved section of palisade with corner of Pocahontas monument in the foreground and plowscars in the subsoil.

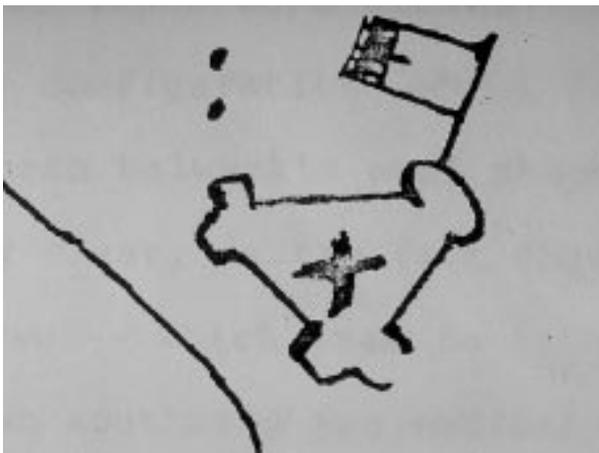


at 20' intervals along the slot trench and their alignment with their long axis perpendicular to the slot trench. Two support postholes (JR66A,B,C and JR66D,E,F) were uncovered during *Jamestown Rediscovery* and the third (JR66G,H) in 1949 by J.C. Harrington. These buttress postholes were situated just a few inches off the north side of the slot trench and excavation of two of the postholes showed they had a slight incline, indicating that they leaned toward the palisade.

The postmolds of the buttress postholes were a 9"-by-12" oval (JR66A,B,C) and an approximately 10" in diameter circle (JR66D,E,F). At present, one support posthole has only been partially excavated (JR66A,B,C), and the other has been sectioned (JR66D,E,F). The two support postholes contained only three European artifacts, a crude local tobacco pipe bowl, the base of a crucible, and a lead musket ball. These objects were found in the construction backfill of posthole JR66D,E,F and are consistent with the early date suggested by the finds in the slot trench.

A curved section of slot trench was uncovered at the east end of the excavation area. The 24-foot long arc translates into a circle with a diameter of approximately 50'. The landward end of the arc runs under a monument, while the riverside end abruptly stops. At present it is uncertain whether the sudden stop is the result of subsequent land disturbance or is intentional and may correspond to the gap in the east bulwark depicted on the Zuniga map. The Zuniga map is the only known depiction of James Fort. Dating to 1608, the plan was copied from a map drawn by John Smith and sent by Pedro de Zuniga, the Spanish Ambassador in London, to Philip III of Spain (Noël Hume 1994: 204-5).

Zuniga Map of 1608.



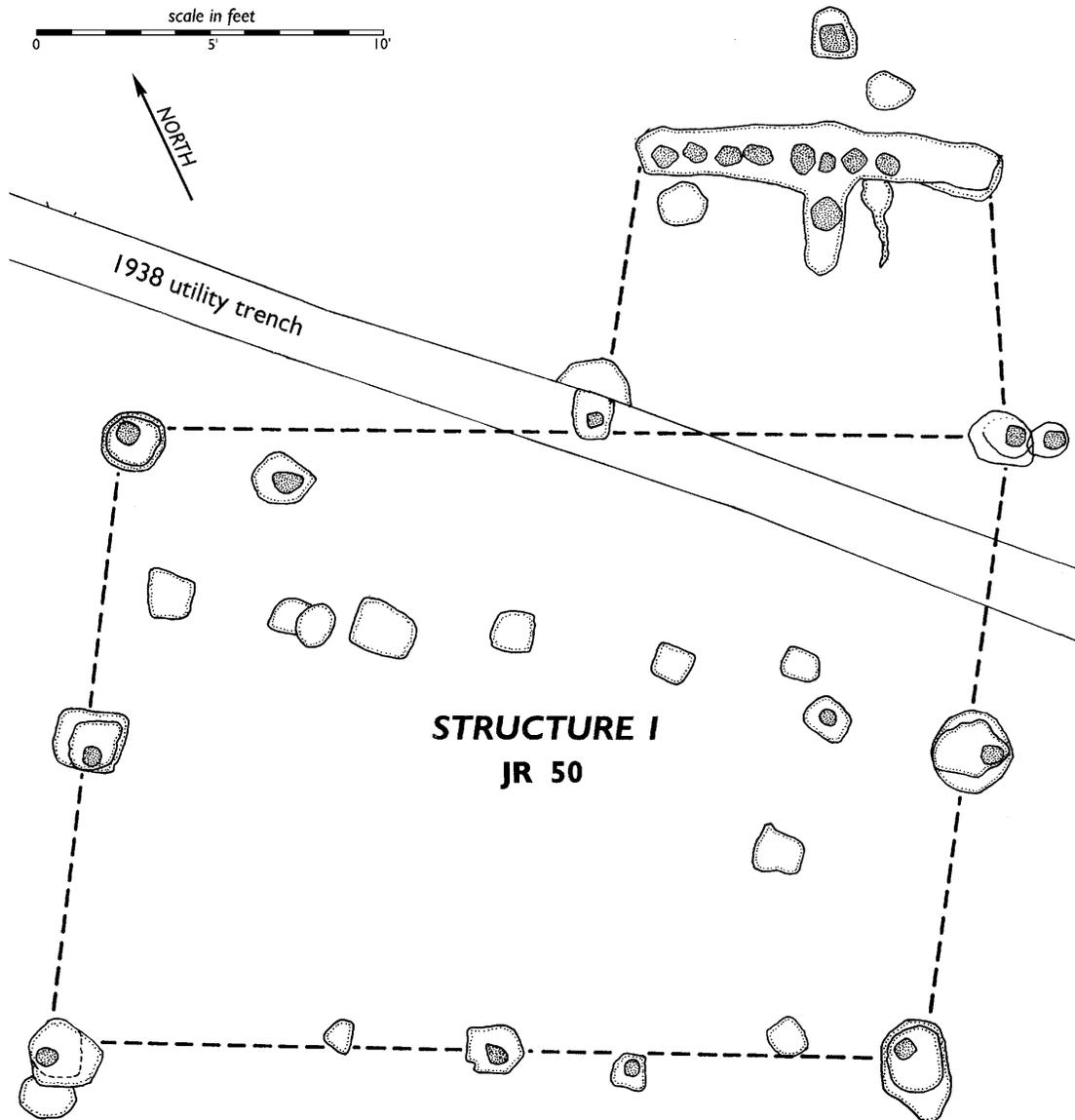
Pit II prior to excavation.

There are no buttress postholes for the "bulwark" palisade, although there are several large postholes in the immediate vicinity. The absence of buttress postholes along the curved slot trench may imply that the palisade functioned as a retaining wall for an earthen ramp that formed the projecting bastion or bulwark. At this time, the palisade and postholes have not been excavated.

Pit II (JR4, 10, 11, 12)

Pit II was the label assigned to an enigmatic feature that was completely excavated in 1995. The pit was in four different squares, but mostly in JR10 and JR11. Pit II had relatively straight east and north sides, a less distinct, well-defined south edge, and was disturbed on the west by the intrusive drainage ditches. It was 13' long, at least 6' wide, and was aligned with the palisade slot trench.

The uppermost stratum in Pit II was brown sandy loam with large brick fragments and brick bats (JR10H,K) which covered a layer of mixed clay and loam (JR10N). The floor of the pit contained a thin ashy deposit (JR10V,W).



The pit floor sloped from east to west and there were a series of step-like ridges along the north side. The function of the pit is unknown.

Structure I (JR50)

Structure I, an earthfast building comprised of at least seven hole-set posts, was found slightly more than 11' from and parallel to the slot trench. It had an uncommon plan, was slightly trapezoidal, and one line of postmolds was not in alignment. The east and west walls of Structure I, measured from the outside edges of the postmolds, were 18'9" long, the north wall was 25'6" long, and the south wall was 25' long. Typically, the long or side walls of earthfast buildings are constructed

of posts at 8'-10' intervals that define the bay units of the structure, while the gable or short side has either a single center post or no post at all. Structure I has a reverse plan; the short sides were erected with posts at 9'+ intervals and one long side (north) had a center post.

In addition to its uneven dimensions, the archaeological evidence suggests that Structure I was quite crudely and hastily built. The three postholes that formed the east wall of Structure I all had very distinct postmolds; however, they do not make a straight line. Indeed, a straight line that best fits the three postmolds still has one postmold 1' off line. The basal postmold elevations indicate that the posts were set individually rather than raised in prefabricated sides or tie-beam pairs. For example,



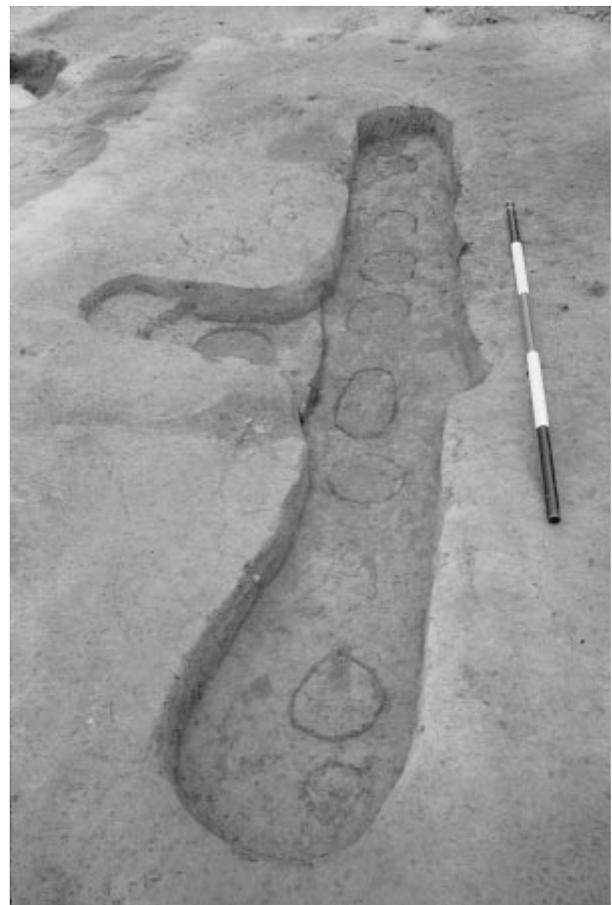
Photo of Structure I showing its proximity to the palisade line.

Unusual T-shaped feature associated with Structure I.

the southeast corner postmold is 1.7' deeper than the other two postmolds in the east wall and is the deepest of any of the postmolds in Structure I.

Structure I has two other problematic features. There are two postholes in the center of the south wall that may indicate a doorway. The uncertainty is twofold. First, although posthole JR50S is almost perfectly centered along the south wall and had the same obvious mixed clay and loam fill as most of the other postholes belonging to Structure I, no sign of a postmold was detected. The companion doorway posthole, JR50AC, being small and square is of a completely different character than the other postholes of Structure I. Depth does not seem to be a factor since the postmold in JR50AC is the second deepest of any in Structure I.

The other uncertain component of Structure I concerns the "T" shaped trench (JR50AG) that is 7' off the northeast corner. The trench, 10'6" long,



is oriented nicely to Structure I as it parallels the north wall and honors the line of the east wall. Partial excavation of the “T” trench revealed soil stains of possible postmolds for a puncheon construction, perhaps a wattle-and-daub chimney or a shed. There was no evidence of burned clay to support the chimney interpretation.

The type and number of artifacts recovered from the postholes suggest that Structure I was built during the initial stage of English settlement of the area. The only artifacts that came from posthole backfills were quartz flakes, tiny pieces of Native American pottery, some fire-cracked rock, and one sherd of lead-glazed coarseware. Nails and nail fragments were completely absent. Accordingly, the scarcity of European material in the postholes indicates that they were dug before any midden accumulated in the area, and thus the building was one of the first, if not the initial, structure erected here. Further evidence of Structure I's early construction date is its orientation to and, therefore, contemporaneity with the palisade slot trench.

Also, six of Structure I's principal structural postholes showed evidence of repair. Original postholes were manifested by their principal yellow clay fill while the replacement postholes showed as mixed loam and clay postholes cutting into the original postholes. In contrast to the original postholes, the replacement or second period postholes contained numerous pieces of daub that were likely remnants of clay plaster on the walls.

There were even fewer artifacts in the postmolds to date the destruction of Structure I—two pieces of glass, some brick fragments, several bits of Native American pottery, and again, no nails. The absence of nails strongly implies Structure I was built with wattle-and-daub walls and a thatch roof. It is conceivable that it did not have any walls but simply was an open shed, perhaps a work space for craftsmen. Whatever its purpose, it is improbable that Structure I was a family dwelling since the nearby Pit I had little domestic refuse. The presence of many animal bones, weapons, and armor in Pit I allows the possibility that Structure I was a crude bivouac for soldiers.

Structure I has little similarity to other early seventeenth-century structures that have been uncovered archaeologically. It is unlike the smaller puncheon houses found at the c. 1617-1625 Maine site that was a suburb of Jamestown (Out-

law). Structure I somewhat resembles a building excavated at Site D at Martin's Hundred. The Site D building, dating to c. 1620-1640, consisted of two lines of three postholes at 7.5' intervals that formed a structure measuring 15'-by-25' (Noël Hume 1991: 267-268). Both Structure I and the Site D building have bay units across their short sides or gable ends. There is little chance that Structure I is one of the three public buildings that are reported during the first years of the settlement. Strachey says the church, storehouse, and corps de garde are in the “middest along with the market place.” A very detailed, and likely somewhat exaggerated, map of Fort St. George provides some interpretive guidance as it shows a smith's house and workshop (Noël Hume 1994a: 117). Given the evidence of glassmaking and copper working in the immediate vicinity, it is possible that Structure I was used by craftsmen.

Post-Fort Ditches

Four ditches dating later than the palisade and pit were excavated. Two large ditches filled in during the second quarter of the seventeenth century extended through the site, both following nearly the same slightly northeast-to-southwest course. Both ditches were completely excavated within the current project area.

The earliest of the two ditches, Ditch I, runs completely through the site and continues beyond the limits of the present excavation in both directions. Ditch I definitely cuts through Pit I and apparently the palisade slot trench as well, although it is possible that the palisade slot trench stops at the point where it intersects Ditch I. Ditch I had a gentle serpentine path and the main channel was 3' wide on average. Ditch I was filled principally with various layers of sandy loam and, compared to the other ditches, had a larger concentration of artifacts. One of the most distinctive features of Ditch I was that the layer deposited on the bottom of the ditch was a reddish, very sandy loam that contained many heavily corroded iron objects and a large quantity of lead shot of various sizes.

Ditch II was clearly defined by its fill which was almost entirely yellow clay. Ditch II cut through Ditch I in at least two places. Ditch II extended from the north edge of the excavation to Pit I, where it intersected Ditch I and was not seen south of this point.

Ditch III ran from the south edge of the excavation, paralleling Ditch I, to about the center of the site, just east of Pit I. Ditch III could not be detected further north from this point. Ditch III sliced through Pit II, but does not seem to have cut Ditch I. The heavy concentration of brick bats and fragments in the fill in the bottom of Ditch III was quite different from the other ditches. Ditch III contained sherds made by the Jamestown potter which dates the filling of Ditch III to post-1630 according to current research.

Ditch IV was unlike any of the other ditches in two respects. First, its direction was northwest-to-southeast; and second, it had a much different contour with crisp vertical sides and a smooth flat bottom. Ditch IV cut both Ditch I and Ditch III.

Ditches I and III clearly seem to be part of a drainage system; Ditch III apparently associated with the “New Towne” period, while Ditch I was in use sometime earlier.



View of the ditches looking north.

Native American Presence

No Native American archaeological features have been found within the project area. The historic features, however, contained numerous Native American artifacts that are predominately Woodland Period, such as ceramics, flakes, and triangular projectile points. There are some lithics that may be attributable to the Archaic Period. One critical question is whether the ceramics, which are mostly Roanoke simple-stamped and thus diagnostic of post-c.1500 A.D. Native American culture, are redeposited into the historic features from previous Native American occupation at the site or are manifestations of Native American interaction.

Dr. Joel L. Shiner located a Native American site in the immediate vicinity of the Confederate Fort during the Project 100 survey in 1955 (John L. Cotter: 13-15). The Native American ceramics recovered by Shiner have recently been reanalyzed and identified as Mockley, Townsend, Cashie, and Roanoke by Dennis Blanton (co-director of the William and Mary Center for Archaeological Re-

search). His research suggests that there is no evidence that there ever was a village on Jamestown Island, but the materials from the Confederate Fort site indicate a succession of seasonal occupations from the Middle Woodland (500 B.C.–900 A.D.) through the Protohistoric (1492–1607), with the heaviest use during the early part of the Late Woodland (A.D. 900–1607). The density of the material suggests that the occupations during the Woodland period may have been Native American farmsteads where crops were raised over a period of several months (Dennis Blanton 1996, pers. comm.).

The archaeological evidence produced by *Jamestown Rediscovery* corresponds directly with the above interpretation. While some Native American ceramics have been found in all major features, there are no postmolds for Native American structures. The absence of Native American houses cannot be attributed to plowing. Postmold patterns for Native American structures have shown up in large numbers at other sites along the

James River, most notably the Pasphegh and Weyanoke village sites, that were plowed for hundreds of years including deep cultivation by modern machinery (Hodges and Hodges; Mouer and McLaren). Thus, at this point, it seems that there was no Late Woodland permanent occupation within the current excavation area and that the scattered small Native American sherds are rede-

posited. In contrast, the concentration of Roanoke simple-stamped sherds representing a nearly complete pot in Pit I cannot be the result of redeposition from earlier occupation. Its presence in Pit I must have been a consequence of the well-documented trade between the English and the Paspheghs.

Scatter of Roanoke simple-stamped vessel found in Pit I.



ARTIFACTS

Analysis of the *Jamestown Rediscovery* artifacts is, of necessity, still in the preliminary stages. This discussion focuses on artifacts from Pit I which dates to the first few years of the Jamestown settlement. In addition, a few significant non-pit artifacts are described.

Beads

There are 88 beads from Pit I. Of these, 76 were glass, seven were copper alloy, four were shell, and one was wood. Only the glass beads are believed to be imports. The copper alloy beads were most likely made on-site by the colonists, as evidenced by the quantities of copper scrap and cut-offs found in association with the beads (see Discussion section, p. 45). The shell beads are all white discoidal marine shell beads. Also known as Roanoke, these beads were made and used by the Woodland Period Indians for currency.

Beads are often found on early 17th-century Virginia sites, but rarely in great quantities. Fewer than 80 beads were located during all the previous archaeological excavations on Jamestown Island, six beads were excavated from the neighboring settlement of the Maine, and only one bead was recovered from nearby Martin's Hundred. The large quantity of beads found in the pit may not be unusual, but rather the direct result of the recovery methodology which included screening and water screening through 1/16" mesh. This process permits retrieval of very small artifacts and ecofacts which might normally be overlooked. Similar field recovery methods were utilized during excavations at nearby Jordan's Point (44PG302), resulting in the recovery of 110 beads from a c. 1620-35 site.

Although beads are technically dress accessories, their presence on early Virginia sites is most likely the result of their value as trade items with the Indians rather than embellishments for colonists' clothing. Recognized since Christopher Columbus's voyages as successful bartering items with the Native American populations, beads comprised an essential part of the standard "gift kit" (Brain 1975) carried by the early settlers of North America.

There is much debate about the origin of the glass beads found on colonial American sites. Venice had a long glassmaking tradition which included beads; but it is also known that Venetians were employed making beads in Amsterdam by the beginning of the seventeenth century. Furthermore, although beads were a stated and desired product of the glasshouse near Jamestown, there is no evidence that this attempt ever succeeded. In the final analysis, glass beads may be most useful for revealing patterns of trade rather than countries of origin.

Glass Beads

All of the glass beads are drawn beads, manufactured by pulling the glass out into a hollow tube which is then cut into bead lengths. Using the classification system of Kenneth E. and Martha A. Kidd (1970) as modified by Karlis Karklins (1985), these are four types.

1. Type IIa: Non-tubular with undecorated monochrome bodies

This is the most common type of bead found on colonial New World sites and is virtually impossible to date. There are 54 type IIa beads ranging in size from 0.2 to 0.9 cm in diameter, with the majority having a diameter of 0.4 cm. (Figure 1) The majority of these (n=31) are blue beads, 19 of which are round and 12 of which are circular. All but two are a cornflower blue and these are cobalt in color.

All the round yellow beads are of a large size (0.6-0.9 cm diameter) and exhibit a polished surface with one end rounded and polished and the other end cut.

2. Type IIIc: Tubular multi-layered with square cross sections

There are eight Type IIIc beads. These beads are also known as Nueva Cadiz beads after an archaeological site on an island off the coast of Venezuela where they were first found. These tubular drawn beads have a three-layer construction consisting of a gray-to-black core, a white middle layer, and a turquoise or cobalt blue surface. The four corners on each end of the square-sectioned bead

are ground down to reveal the underlying layers. Known to be of European manufacture, these beads were once thought to be markers of Hernando de Soto's expedition through the southern United States (Hudson et al: 84). This is because during the first half of the 16th century these beads are only found in the Spanish New World, primarily Venezuela, Peru, and the southeastern U.S. This limited distribution has led researchers of early 16th-century Spanish sites to consider that these beads may be of Iberian origin, but only three of these beads have been identified in all of Spain and Portugal (Deagan: 164).

Nueva Cadiz beads reappear on sites dating to the late 16th and early 17th centuries, but during this time period they are associated with areas trading with the Dutch. Besides Jamestown, the beads have been located in northeastern America including New York, Pennsylvania, and lower Canada. A number have recently been found in Antwerp, Belgium, retrieved from the cesspit of a late 16th-century merchant (Karklins and Oost). The merchant dealt extensively with Venice which suggests that the beads may be Venetian products. However the source of these beads may never be determined because by the late 16th century, beads were being produced in the Netherlands by experienced Venetian glassworkers (Karklins 1974: 64). Perhaps the reappearance of the Nueva Cadiz bead after a seeming 50-year hiatus is a result of this new in-

dustry in the Netherlands and the need to supply the ever-expanding Dutch market in the New World with trinkets to trade with the native populations.

3. Type IIIIn: Tubular with multi-layered bodies decorated with straight simple stripes

Ground on the ends like Nueva Cadiz beads to reveal the underlying layers, chevron beads are also found on Spanish colonial sites in the Americas beginning in the early sixteenth century. Unlike Nueva Cadiz beads, chevron beads continue to appear on Spanish sites up until the 18th century with diagnostic differences. The earlier chevrons appear to consist of seven layers while those of the 17th century have five and those of the 18th century have only four (Deagan: 165).

The single chevron bead from the pit consists of five layers, consistent with the 17th-century examples. It has a white core followed by a black layer, a red layer, and then covered on the surface with blue and white stripes. It is faceted and ground on the ends to reveal the underlying layers

4. Type IVa: Non-tubal , multilayered and undecorated

There are twelve type IVa beads from the pit assemblage. These beads are all circular with a white core and a cobalt blue exterior. They all measure between 0.2 and 0.3 cm in diameter.

Figure 1: Type IIa Beads.

	Round	Circular	Round	Round	Circular	Circular	Round	Total
Size-cm	Blue	Blue	Yellow	Black	Black	White	White	
0.2		8			1	1		10
0.3	2	4		1	5	1		13
0.4	11				1		3	15
0.5	1			1				2
0.6	3		2					5
0.7	2		5					7
0.8			1					1
0.9			1					1
Total	19	12	9	2	7	2	3	54

Copper Alloy Beads

Seven tubular copper beads were found in the pit, each rolled in tight circles from very thin sheet copper. In association with these beads were many odd-shaped fragments of scrap copper alloy. These fragments are consistently thin and appear to be cut-offs from sheet copper alloy rather than from recycled copper alloy objects. Rolls of sheet copper and brass, about 10 cm in width, were exported from production centers in Germany and Belgium for the production of small finds in the 17th century (Justine Bayley 199, pers. comm.). Many of the fragments from the pit were roughly rectangular with one edge straight and the other slightly curvilinear where it was apparently cut off the sheet. Most of the beads exhibit this same curvilinear edge.

Wooden Bead

A singular wooden bead-like object of unknown variety was recovered from the pit. It has an unusual conical shape with a very flat cut base. The “bead” has slightly beveled sides just above the base and then tapers to a 0.2 cm diameter opening. It is very unusual that a wooden object would survive in a non-aquatic environment. No parallel is known for this object.

Shell Beads

Four shell beads, all 0.4 cm in diameter, were recovered from the pit. It is possible that these artifacts are remnants of prior Native American habitation on the site. On the other hand, they could represent, as does a large shell-tempered simple-stamped pot in the pit, interaction between the colonists and the Indians.

European Ceramics

A minimum of thirty-eight vessels were excavated from the pre-1610 context of the pit. At least nine are of English manufacture, eleven are considered Anglo-Netherlandish, ten are German, three vessels are French, and one is possibly Spanish. The remaining three vessels are unidentifiable at this time. The large proportion of Continental ceramics reflects the cosmopolitan nature of trade in the early 17th century. Recent research has suggested that much of the material culture found on early 17th-century sites in North America is the result of Dutch traders who offered better exchange rates and a wider array of goods to the colonists than did England. As England attained commercial control of North America in the late 17th cen-

Figure 2:
Vessel Forms
By Ware.

WARE	Porringer	Costrel Flask	Pipkin	Jug	Dish	Mug	Jar	Bowl	Unknown	Drug Jars	Crucibles
Border ware	1	1	2		2						
Blackware						1					
Refractory											8
Delftware										11	
Frechen Stoneware				2							
Martincamp		3									
Midlands Purple							1				
North Devon							1				
Spanish Coarseware								1			
Unidentified- Coarseware							1		1		
Unidentified- Slipware									2		
Total	1	4	2	2	2	1	3	1	3	11	8

ture, the material record becomes more homogeneous and more predominantly English.

The vessels from the pit are overwhelmingly hollow wares reflecting the importance of ceramics as a means of storage, particularly of liquids. Of the 35 identifiable forms, only two (6%) are dishes. The most common vessel is the drug jar, comprising 31% of the identifiable forms. Twenty-three percent of the vessels are not part of the foodways of the early colonists but are crucibles used in glassmaking and other industrial processes.



Bartman jug dating c. 1600.

Frechen stoneware

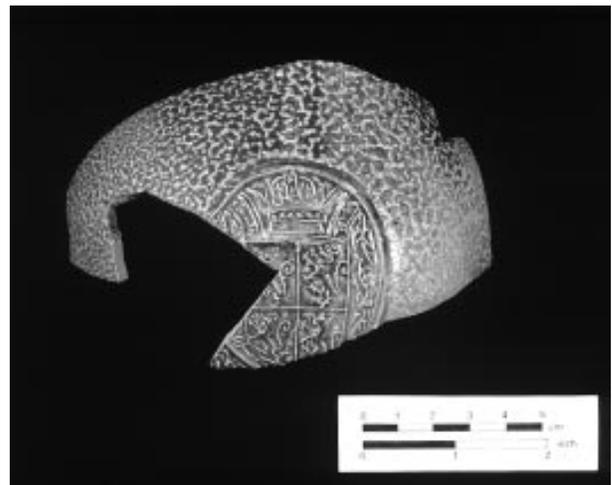
The brown salt-glazed stoneware from Frechen, Germany, west of Cologne, dominated the English market from the mid-sixteenth century through the seventeenth century. The most commonly found Frechen form on early Virginia sites is the Bartmann jug. This form, serving as a beverage storage and serving vessel, prevailed until replaced by the large-scale production of glass bottles and the development of English stoneware in the late-17th century.

At least two Bartmann jugs were recovered from the pit, both dating to the early 17th century. The first jug exhibits a mask with a curved ladder mouth. It mends from rim to base, although the base mend is very slight and not sufficient at this time to support the top. The jug would have had three ovoid medallions. Only parts of two remain, both appearing to have been sprigged from the same mold. The medallion consists of a crowned shield which has been divided into four quarters. The first and third quarters exhibit a lion passant guardant and, on a fess in chief, three stylized fleur-de-lis. There are two lions passant guardant in the second and fourth quarters.

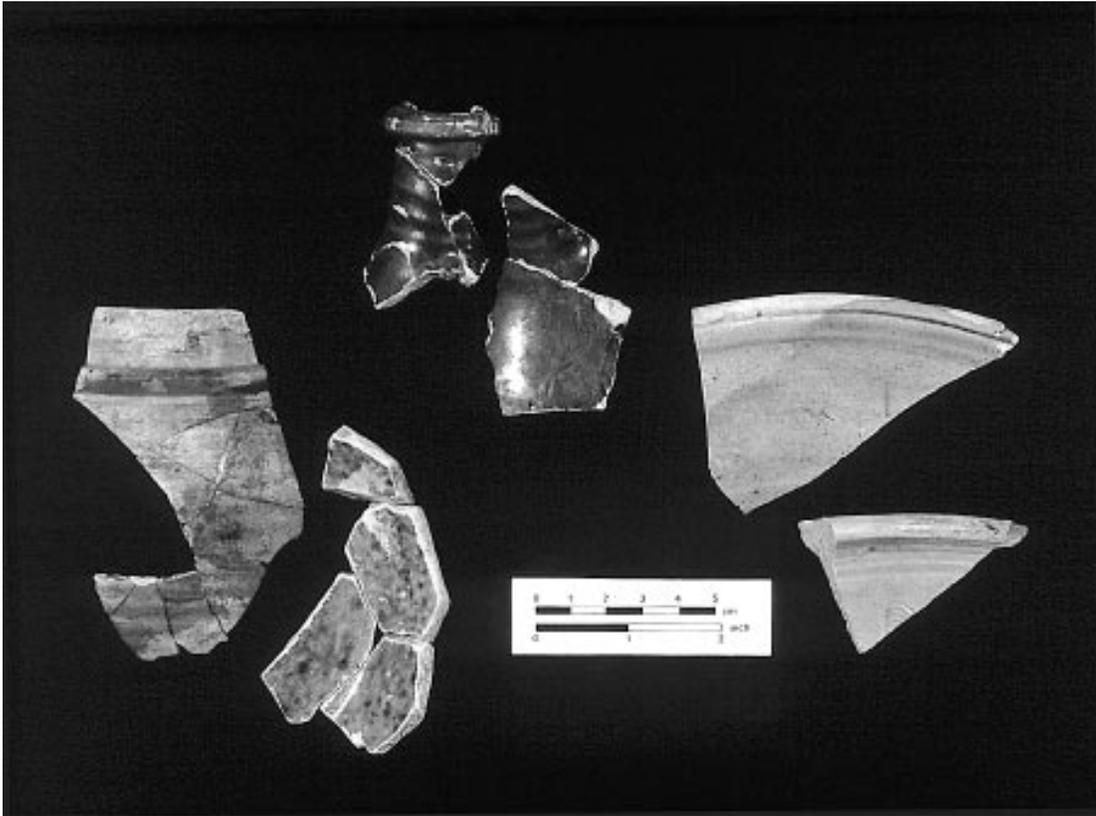
The second jug consists simply of a body section with a single medallion. The medallion also has a crowned shield, but in each of the four quarters is a lion rampant.

Border Ware

“Border ware” is a term that has been adopted to describe the pottery produced in the border areas of Hampshire and west Surrey counties in England during the 16th and 17th centuries (Pearce: 1). Developing out of the “Tudor Green” tradition of the late medieval period, it has also



Bartman jug medallion.



Assemblage of Border ware vessels including a cooking pot (left), costrel (center), and two flanged dishes (right).

been described as “Surrey White ware.” Characteristically finely potted with a buff fabric and a bright green or yellow glaze—it can also have an olive or mottled brown glaze—this ware has been found on tidewater Virginia sites dating to the first quarter of the 17th century.

The Border ware potters were one of the main sources of pottery for London in the 17th century. The dissolution of the Virginia Company in 1622 may explain why this ware is not found in mid to late 17th-century contexts in Virginia, despite the fact that during this time “the Border industry had become one of the major suppliers of everyday, domestic pottery to London and remained so at least until the end of the century” (Pearce: 97). Once the Virginia Company’s control over the sources of supply for the Virginia settlement is broken, the colonists’ market is no longer confined to goods transported by ships from London. This pattern of shipment from London has also been used to explain the presence of these wares in Exeter in the 17th century (Allan: 126-127).

The pit yielded six Border ware vessels, including a porringer, a costrel, two pipkins, and two

dishes, the only two flatware forms from that context.

The porringer, “which was common in the early post-medieval period both in England and on the continent, was intended to hold a variety of foods, such as broth or porridge” (Pearce: 15). Consisting of a rim sherd representing a 9 cm diameter vessel, it is green glazed on the interior and just over the thickened, slightly out-turned rim. The body is carinated 2.8 cm from the rim. Unlike most Border ware porringers, which are ribbed around the upper part of the body, it has only very slight grooves made by the potter turning the vessel on the wheel.

The neck and body sherds of a bottle-shaped costrel are in the assemblage, but include none of the pierced lug handles for this form. The bottle-shaped costrel, which has been assimilated with the Bartmann jug in form, appears to have replaced the mammiform costrel by the start of the 17th century (Pearce: 30-31).

Like the majority of costrels recorded in London, the costel in the pit is glazed externally with green glaze which “was the traditionally preferred colour for this form” (Pearce: 31).

Two of the Border ware vessels are tripod pipkins. One has external ribbing and an external lid seating, which is a feature that apparently first appeared in the late 16th century (Pearce: 18). The seating is provided by a simple flange positioned 1.6 cm below the rim which is rounded in profile like a cordon. The interior of the vessel is covered with a spotty yellow glaze. The base is very flat and has been knife-trimmed just above the base angle. There are no feet that mend to the base.

Tripod pipkins functioned as vessels for heating or cooking food over a fire and 75% of the examples studied in London show evidence of burning (Pearce: 20). The pipkin from the pit has sooting on the base and up the sides.

The second pipkin is represented by the rim only which is everted with internal seating. The vessel is covered on the inside with olive green glaze.

Two flanged dishes, both of a late 16th–early 17th-century type, are the only flatwares from the pit. The first has a thickened and folded rim, 17.6 cm in diameter, which creates a squared profile below the 5.2 cm wide flange. The outer edge of the rim is defined by a slight groove, and an incised line runs along the top. The dish is yellow glazed on the interior up to and just over the edge of the rim. This vessel was probably used solely for the serving of food as there is no sign of it being used on a chafing dish, as with some of the London examples.

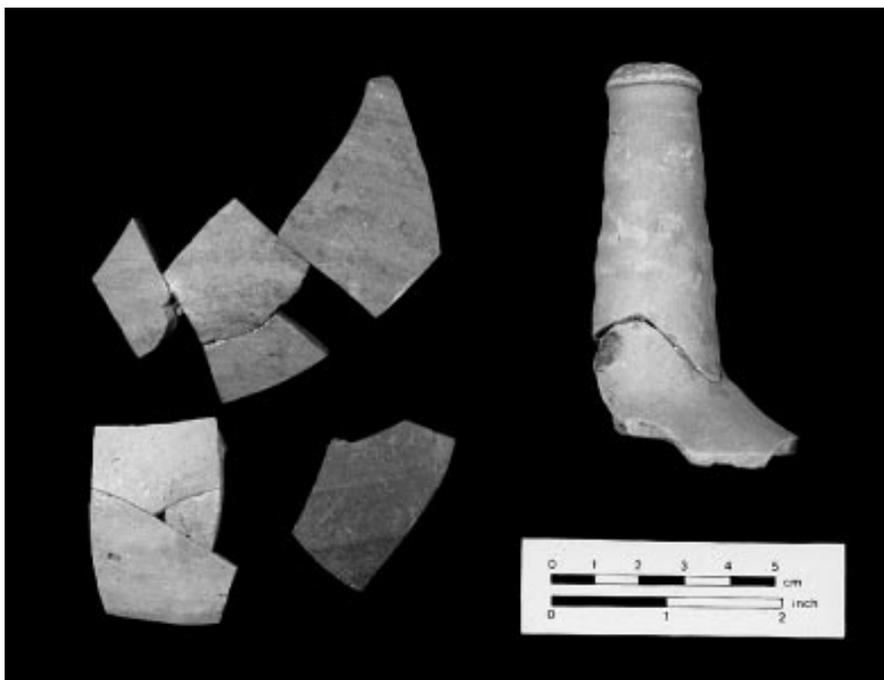
The second flanged dish has a thickened rim, 20.3 cm in diameter, above and below the flange with a rounded outer edge. There is a single groove on the outer edge of the rim. The vessel is yellow glazed on the interior only, up to the edge of the rim and just over. The flange is decorated with wavy incised lines created by a four-pronged comb. A parallel dish (Pearce #29Y) is dated to the second half of the 16th century.

Midlands Purple

This ware was produced in the English Midlands in the form of large cylindrical jars known as butterpots. As its name implies, the butterpot was made as a container for butter and its size and weight were highly regulated by national laws (Egan: 97). The hard, red, near stoneware fabric is spottily covered on the inside with a glossy black iron glaze. A single butterpot was recovered from the pit.

Blackware

Blackwares developed out of the Cistercian ware tradition and “form one of the most common types of English post-medieval pottery” (Barker: 59). This ware was made through the 17th and 18th centuries and consists of a bright orange to red fabric covered with a thick shiny black glaze which “is achieved by adding manganese as well as iron to the lead glaze” (Jennings: 152).



Martincamp flask fragments.

The only form of this ware in the pit is a handled drinking vessel represented by one base, one rim with handle, and body fragments.

Martincamp

This French ware was probably made exclusively for export, as it has rarely been found in France (Ickowicz: 52). It is commonly recovered from 16th and 17th-century sites in England in the form of flat-sided flasks with long necks. Martincamp flasks were seemingly exported empty to serve as canteens for field workers and soldiers (Allan: 42).

At least three flasks are represented by one neck and body fragments. The earthenware fabrics are all of Hurst's Type III ranging from an orange to a near stoneware reddish orange to a hard reddish brown (Hurst et al: 102-104). A series of three, double incised lines decorates the exterior surface of one of the vessels.

Spanish Coarseware

One unglazed bowl is represented in the pit by rim and body sherds. The orange fabric is extremely gritty with micaceous inclusions. There is some sooting on the exterior, suggesting that the vessel was used in the heating or cooking of food.

North Devon Ware

A single jar represented by base and body fragments has been tentatively identified as a North Devon vessel. The unglazed vessel exhibits an orange fabric with fine quartz grains and has a reduced interior core appearing gray.

Unidentified Slipwares

Two unidentified slipwares were recovered from the pit. The first exhibits an orange soft bricky fabric with micaceous and fine quartz inclusions. The interior is covered with a thin copper oxide slip appearing mottled yellowish green. A single leg suggests that the vessel is probably a cooking pot. The leg, which has been pulled from the base of the vessel, is 3.5 cm long and has been smoothed by a thumb impression on the bottom edge causing it to be slightly indented.

The second vessel has an orange hard bricky micaceous fabric with an interior gray margin. The inside of the vessel is covered with a thick white slip over which the lead glaze appears yellow. The exterior of the vessel is full of voids where inclu-

sions were dragged through the clay. A fragment of the base has a pot scar on the exterior caused by the thick olive-green-to-brown glaze which had run over onto it.

Unidentified Coarsewares

Two coarsewares from the pit are presently unidentified. The first is a storage jar with the same fabric as the second unidentified slipware described above. It is covered on the interior with olive green lead glaze. The jar has a thick everted rim with large thumb impressions around the perimeter. The exterior shoulder exhibits heavy throwing rings.

The second vessel is comprised of several fragments of a buff, low-fired fabric. The form appears to be hollow with knobs or projections on the exterior. One of the sherds has rouletting similar to that seen on tobacco pipes. In addition, impressions which could be made by pipe stems are present on some sherds leading to the idea that perhaps this is part of a pipe muffle kiln.

Delftware, Anglo-Netherlandish

The only delftware forms in the pit were represented by a minimum of eleven drug jars. Attribution of late 16th early 17th-century tin-glazed

Delftware drug jar painted in an orange, blue, and manganese palette.





Three drug jars with similar painting styles.

earthenwares found on English sites is very difficult. This is because there was much interchange of potters and clay between England and the Low Countries during this period. Country of origin, therefore, cannot be determined on decorative or stylistic grounds, or even by chemical composition.

Throughout the 17th century, tin-glazed earthenware was known in England as galleyware, probably after the flat, one-decked Mediterranean ships known as galleys that were employed to import the early Italian and Spanish tin-glazed earthenwares (Noël Hume 1977: 3). The term “drug jar” was not in contemporary usage. Instead, these objects were known as “vessels for apothecaries.” Archaeological excavations and documentary evidence have proven that this form was not solely used by surgeons and apothecaries for holding medications, ointments, and salves. Drug jars have been uncovered on sites not inhabited by these professions and have been found to contain other substances, including paint (Noël Hume 1971: 43). Recipes, such as a late 16th-century method for making wet suckets, fruit preserved in syrup, often specify the use of a *Galley pot* for storage of foodstuffs (Brears: 108).

One almost complete drug jar is 9 cm in diameter and would have been about 14.5 cm tall. It has a leaded interior appearing yellow and a thickened and V-shaped foot. It is painted with a mid-girth band of bright orange diamonds, each with a central blue diamond bearing a blue dot. A line of blue dots at the base is sandwiched by triple blue lines on each side. The midsection motif is flanked

by a double blue line, a manganese line, and a double blue line at the top, and a triple blue line and a manganese line at the bottom. The manganese appears gray.

Three nearly complete drug jars exhibit similar painting, suggesting they may have emanated from the same kiln. Two appear to be approximately 10 cm in height and 6.5 cm in diameter at the base. They are both decorated with a sloppily applied series of thin “X’s” at mid-girth, although one has blue “X’s” while the other has manganese ones. A third drug jar is smaller, about 8.5 cm in height and 5.0 cm in diameter at the base. It is painted with a series of thick blue “X’s” and is slightly waisted, a characteristic of the late 16th century (Archer and Morgan:15).

Crucibles

All eight crucibles from the pit are composed of a refractory earthenware fabric predominantly consisting of quartz sand. Recent research indicates that this ware was made in the Hesse area of Germany (Cotter 1992). Two shapes are reflected in the assemblage: the beaker, which is conical with a single pouring spout, and the triangular, which has three pouring spouts. Molten glass, remnants of glassmaking, was only found adhering to the two crucibles of beaker form. One of the beaker crucibles mends to a pair of fused crucibles (APVA #A-626), which were located in 1938 during excavations of a utility trench. These crucibles appear to have been purposefully fused, with one serving as a lid. The contents were extracted by

cracking open the “lid” on one side. The surviving crucible of this pair is 8.5 cm in height.

The remaining six crucibles are of varying sizes between 5.5 cm and 8.5 cm. They all exhibit a fabric consisting of a light gray matrix with yellow brown quartz grains. The surface is dotted with occasional iron-oxide appearing dark brown. Four of the crucibles have a slight indentation on the outside just above the base where they may have been wiped. Only two of the triangular crucibles show signs of having been used, although X-ray fluorescence has not yet been conducted on these vessels to determine if they contain any residues.

Pipes

Tobacco was probably introduced to Europe by Spanish explorers returning from the Americas in the first half of the 16th century. Much of the early Continental use of the weed was in the form of snuff or cigars, as this was the way tobacco was ingested in the areas settled by Spain. This influence is not seen in England, as English explorers such as Sir John Hawkins and Sir Francis Drake first encountered tobacco use by people using pipes (Walker: 30). Smoking was first adapted in

England as a medical treatment and, as early as 1573, the populace is observed to be curing ailments by “the taking-in of the smoke of the Indian herbe called ‘Tobaco’ by an instrument formed like a litle ladell” (William Harrison, *Great Chronologie*, as quoted in Oswald, 1975: 3). It is not known of what material the “ladell” was made, but by 1598 clay pipes were being used.¹ A German lawyer noted in that year that “the English are constantly smoking Tobacco...they have pipes on purpose made of clay” (Paul Hentzner, *Itinerarium*, as quoted in Oswald 1975: 5).

Although little documentation remains of the first London pipe makers, it is clear that by 1601 there was a pipe-making industry significant enough for an enterprising company to establish a pipe-making monopoly (Tatman: 5). When the company of pipe makers was formed in London in 1619, there were 36 charter members, which is believed to be only a small number of the pipe makers actually working at the time (Crossley: 276).

The early clay pipes typically have a small bowl because the tobacco was strong and expensive.² The pipes are also mold-made and a high proportion made before 1610 have heart or tear-drop shaped bases (Oswald 1975: 34). These heart or tear-drop bases have been recorded at Fort St.

Crucibles from the pit. The two beaker-shaped crucibles on the left contain molten glass.





English white ball clay tobacco pipes with tear-drop shaped bases. The pipe heel on the upper left is marked with an incuse "S"; the one on the upper right bears a rouletted line.

George, Maine, dating 1607-1608 (Brain 1995), and from the 1609 shipwreck *Sa Venture* (Wingood: 155).

From the pit context there were only two undiagnostic English tobacco bowl fragments. The plowzone layers of the site, however, yielded complete bowls that exhibit the characteristics, including marks, of pipes dating c.1590–1610 found in London (Oswald 1975: 35-36). These are:

- JR75A: Buff, milled lip, tear-drop shaped base, SHD: 6/64.
- JR76A: Off-white with reddish orange surface, plain rim, tear-drop shaped base, stamped with incuse "S"; SHD:8/64.
- JR3J: Off-white with reddish orange surface, milled lip, "waisted" bowl; rouletted line across heel; SHD: 7/64.
- JR9F: White, milled lip, tear-drop shaped base; SHD: 8/64.

Of the 10 English tobacco pipe stems recovered from the pit, five of the stem holes are unmeasurable, two are 9/64", two are 8/64", and one is 6/64". This wide variation in measurement is not surprising for it has long been shown that stem hole diameter measurements do not hold up for the earliest period of clay pipe production (Noël Hume 1991: 300-301). None of the stems is decorated, which is the norm in the seventeenth century (Oswald 1975: 96). There are decorated stems coming from the pit but these are made from micaceous and hematite-rich local clays appearing gray to red in color.

Tobacco pipes made of the local Virginia clays and found in colonial contexts have been attributed variously to the white settlers (Henry 1979), Indians (Noël Hume 1991), and slaves from Africa (Emerson 1988). From the documentary and material culture evidence, all three groups were engaged in producing clay pipes at one time or another, and the forms and decorative motifs appear to embrace influences from all three ethnic groups.

Six of the total 30 locally-produced pipe stems in the pit are decorated with the same pattern applied with a stamp yielding four relief fleurs-de-lis in a diamond-shaped cartouche. Sometimes a diamond pattern of four incuse fleurs-de-lis is added to the design. This motif has traditionally been associated with tobacco pipes produced in the Netherlands as shown by the large concentration of Dutch pipes from Plymouth bearing variant patterns of fleurs-de-lis in diamond cartouches (Oswald 1969:138-139).

The Dutch are known to have a pipe-making industry after 1609, supposedly established by political refugees from England (Oswald 1969: 138). Some of these early pipe makers may indeed have been English veterans of the Dutch war of independence from Spain (Schaefer: 338), as were many of the first Virginia colonists. Could the local pipes in the pit be the products of an English pipe maker who had spent some time in the Netherlands? The answer is not clear, because some of the pipes bearing these marks are faceted and there

is no early tradition in England or in the Netherlands for faceted pipes. Faceted pipes are associated with Native American contexts but usually not dating before the second quarter of the 17th century. Could the colonial pipe maker be emulating a pipe shape he is seeing used by the Indians, perhaps made of a different medium than clay?

There is a very distinct faceted pipe bowl from the pre-1610 pit context. It has an unusually large bowl and is made of a gray, gritty clay that is atypical of both the local reddish orange fabrics and the English white-ball clay products. The surface of the bowl has been scraped to form the facets. Large voids are visible on the surface of the bowl, which were caused by the scraper as it was dragged across the many inclusions in the clay. Is this yet another product of the Anglo-Netherlandish pipe maker, perhaps using clays brought with him from Europe?

Coins

Three coins were excavated from the pit—two copper Irish pennies and a halved silver English half groat. The pennies are both from the reign of Elizabeth I and bear the initials “ER” astride the royal coat of arms on the obverse and a crowned harp on the reverse. One of the coins (JR3BS; 98-JR) is dated 1602; the date on the other coin (JR1Q; 42-JR) is indecipherable but it would be either 1601 or 1602. A third Irish penny (JR2D; 92-JR) was found in plowzone, and it was also dated 1602. Irish coinage is occasionally found on early Virginia sites. The reason for this can probably be found in the extreme shortage of coinage with low denominations, rather than a direct association between colonists and Ireland.

The obverse of the silver coin (JR1P; 38-JR) bears the legend (RE) *GINA ELI(ZABETH)* with a hand mint mark, dating the coin to c. 1590-1592. The royal coat of arms appears on the reverse. The coin is a half-groat piece, worth two pence, which has been halved to create a quarter groat. It is not unusual to find cut coins on early 17th-century sites. During this time period the intrinsic value of the metal was equal to the value of the coin. The scarcity of coinage in small denominations led to the common practice of clipping coins to make small change.

Jettons

Jettons are coin-like objects that originated during the Middle Ages as mathematical aids in the casting of accounts. Functioning much like an abacus, the jettons were used in association with a counting board or cloth in an ocular or visual arithmetic. Calculations could be manually tracked as the jettons were moved over lines and spaces representing decimal units. By the beginning of the 17th century, this traditional role of the jetton was generally obsolete, as evidenced by its disappearance from English wills and inventories (Barnard: 87). In all but the uneducated classes, a written method of calculation using Arabic numerals was employed, largely encouraged by the wider availability of paper and pencils (Barnard: 90).

Jettons are not uncommon finds on early 17th-century Virginia sites, but how they were used in these contexts may never be determined with certainty. An obvious assumption, knowing the Native Americans’ penchant for copper at the time of contact, is that these cheap redundant objects were used for trade. On the other hand, there is reference to the use of jettons as gaming tokens up to the 18th century (Barnard: 87), and it is just as likely that they were used in this way. Finally, just because the counting board was out of common usage in England does not mean that the colonists would eschew it. They would certainly have been familiar with its use, and it would have been a useful item to bring where paper and pencils are scarce and where few of the inhabitants are literate.

Twenty jettons have been recovered from the excavation and four of those were found in Pit I. The Pit I jettons are all products of Hans Krauwinkel II of Nuremberg. Hans Krauwinkel II used some of the same designs as his famous uncle working before him, but the younger’s jettons can be distinguished by the use of two “N’s” in Hanns. He is listed as a master (*rechenpfennigschlager*) upon the death of his uncle in 1586 and his own death is recorded in 1635 (Mitchiner: 435).

All four jettons are of the rose and orb type, which are “the most commonly encountered jettons of Hans Krauwinkel II, both in a general sense and also among the jettons recovered from the River Thames in London” (Mitchiner: 435). The design consists of a central rose on the obverse sur-

rounded by alternating crowns and fleurs-de-lis, and an imperial orb, or *Reichsapfel*, on the reverse surmounted by a cross patty. Krauwinkel's jettons typically bear inspirational sayings, usually reminding the owner not to place monetary matters above God. Three of the pit jettons have the inscription *GOTT ALLEIN DIE EERESEI* or "Honor God Alone." The fourth jetton maintains that *GOTES SAGEN MACHT REICHT* or "God's Words Bring Wealth."

There are nine Hans Krauwinkel II rose and orb jettons from the site that have decipherable legends. Five are of the *GOTES SAGEN MACHT REICHT* variety and four are *GOTT ALLEIN DIE EERESEI*. The uniformity suggests that these jettons were all part of a set; jettons were normally sold in a "cast" of 100 (Barnard: 83).

Book Furniture

The metal hardware, such as clasps, bosses, and corner plates, that is often found on medieval and post-medieval books is known as book furniture. These objects, which are predominantly brass, are the only evidence of books remaining to recover from Virginia archaeological sites. They are not found often, and when they are, it is usually on the site of someone of high socio-economic status. But one cannot take the presence of book furniture

on a site as an unequivocal sign of a wealthy and formally educated person. Inventory research has shown that many poor and supposedly illiterate households in colonial Virginia possessed a Bible or some other religious book (Carr and Walsh).

Book furniture consists of clasps and bosses. The book clasp, which spans the leaves of a book and secures it in the closed position, developed from the need to keep the early medieval manuscripts from warping. These manuscripts were written on vellum, which absorbed moisture easily and would warp and splay. Early bookbinders found it necessary to press the leaves flat between heavy wooden boards secured with brass fittings. Once paper came into widespread use in the 16th century, bindings of pasteboard replaced the heavy board covers. It was difficult to secure the clasps tightly to the lightweight pasteboard, and clasps fell into disuse. When they were used it was more for decorative effect and their use continued most prominently on Bibles and ecclesiastical texts (Bearman et al: 23). In England, books were usually shelved with the foreedge, and thus the clasped edge, facing the viewer. This encouraged the use of decorative clasps and even decoration on the page edges (Bearman et al: 23)

The book clasp consists of several elements. The hasp is the most common component of the book clasp found on Virginia sites. It is the moving part that spans the leaves of the book and latches

Literary-related artifacts including: (top, left to right) brass book corner plate; brass wax seal and chain; lead ink well; iron book chain; and (bottom) brass book clasp consisting of a hasp and catch plate.



the catch plate or pin. The catch plate is riveted either to the front or back cover, onto which the hasp is hooked. English bindings tend to hinge the hasp to the upper cover, whereas in Germany and the Netherlands the clasps were hinged from the lower cover (Bearman et al: 161). The back plate, which is usually iron, is attached to the back of the hasp and helps to secure the leather hasp strap.

Bosses are the corner and center plates that are attached to the covers of the books to protect the surface from dirt and abrasion. These developed in the early medieval period when the large heavy books were stored flat rather than upright and provided the books some protection as they were dragged across table tops. With increased book production and the concomitant growth in the number of small personal libraries during the Renaissance, books began to be shelved upright. Bosses encumbered this type of storage and quickly fell into disuse, continuing only on liturgical texts (Mowrey: 7).

The brass book furniture to at least four books was recovered from the pit. Three of the books in the pit are represented by their hasps only. One hasp is complete at 7 cm in length. It has an iron back plate, and is decorated on the surface with a stamped semé of fleur-de-lis. The fleur-de-lis is a common decorative motif on bindings, and the clasps were sometimes decorated to complement the rest of the binding design (Mowrey: 24). Two of the hasps are very narrow, 1.3 and 0.9 cm, and appear to be from thinner volumes than the two other hasps. From the iron back plate on one of the hasps (205-JR) it appears that its 5.3 cm length is almost complete. The other hasp is 4 cm long but is broken off and has no sign of a back plate.

The fourth clasp (274-JR) includes a 8.5 cm long hasp, a 3.3 cm long catch plate, and a single corner plate (97-JR). All three pieces are decorated on the surface with concentric circles around the rivet holes. The hasp has an iron back plate for attachment to the leather strap hinge on the upper cover. It is unusual to find so many elements of a book *in situ*, which suggests that the book was intact, with its furniture, when it was discarded. Since books were considered as valuable and rare commodities, this would not have occurred unless the book was irreparably damaged—perhaps burned. John Smith documents the January 1608 fire in the fort in which “Good Master Hunt our preacher lost all his library, and all that he had (but

the cloathes on his backe,)....” (Barbour: 217-218). This book may be a remnant of Reverend Robert Hunt’s library, discarded in the pit after the fire because it was unreadable.

Although not technically book furniture, an iron chain with three rectangular-sectioned links may be associated with one of the books. Chained libraries were common in monasteries and colleges in the late Middle Ages and continued in use in a few English cathedrals until the end of the 17th century. “To protect a valuable book from being stolen...books were sometimes chained to podiums or shelves” (Mowrey: 10). The chain would be attached to a hasp that would pierce the cover of the book. The other end would be securely fastened to a heavy piece of furniture. Perhaps Reverend Hunt thought it appropriate to chain up his valuable copy of the Bible in the first church, which was nothing more than a tattered tent, so that it would be safe but accessible for all to peruse. It, too, probably found its demise in the fire.

Firearms

Matchlocks

The matchlock is often found on early Virginia sites, and it is the only type of ignition system represented in the pit. It is a type of firearm that mechanically holds and operates matchcord for ignition.³ For over 250 years the matchlock was popular military issue because it was a simple mechanism and thereby relatively inexpensive to maintain and repair. In the early 17th century, it was fitted to a shoulder arm known as the caliver or harquebus, weighing between 12 and 15 pounds, and to the heavier musket of about 20 pounds. A forked rest was required to aim and fire the unwieldy musket but it continued to be used, because it had greater range over the caliver.

The biggest problem common to all matchlock arms, however, surrounded the basic necessity of matchcord. The soldier had to keep the match constantly burning, usually at both ends, so there would be a ready source of fire for ignition. The smoldering match made the soldier, who also had to carry gunpowder on his person, vulnerable to burns. In addition, the burning match made a very visible target at night, but was necessary in the



Top element of musket rest and lockplate from a matchlock firearm.

face of imminent danger as there was no way to ignite the match quickly. The match could also be easily extinguished by inclement weather rendering the soldier defenseless. Finally, the matchcord had to be made in England, making the colonists dependent on supply for fire power.

There are two types of matchlocks, both of which are represented in the pit. The earliest type is the sear lock, which was developed in the mid-15th century, borrowing technology from the cross-bow. In this mechanism, the serpentine is rotated down onto the pan by applying pressure to an L-shaped lever screwed into the end of the internal sear. By the late 16th century, matchlocks were also made using a conventional trigger which was mounted in the stock separate from the lock. This innovation had advantages over the sear lock in that “the lock could be easily removed; the trigger could be enclosed within a guard to prevent accidental firing; and an easier grip gave a better aim” (Howard Blackmore: 18).

It is this trigger, or “tricker,” lock that is depicted in Jacob De Gheyn’s illustrations for *The Exercise of Armes for Calivres Muskettes and Pikes (Wapenhandelinghe)* published in 1607 for Maurice, the Prince of Orange. There is documentary evidence that De Gheyn began the drawings between ten and twelve years earlier (Museum Boymans

van Beuningen: 46) which places use of the trigger lock as early as the 1590s. Although the trigger lock was considered an improvement, as reflected in its higher cost⁴ and the references to conversions from sear locks,⁵ the trigger lock did not supersede the sear lock and they were both used through the seventeenth century.

The parts to at least five matchlocks were recovered from the pit. Four of the matchlocks are of the sear lock type and one is of the conventional trigger type. It is possible to distinguish the two types of matchlocks dating to the late 16th and early 17th centuries even if only the lockplate remains. On the trigger-lock matchlocks the slot for the sear spring is positioned beneath the sear and near the serpentine, whereas on the sear-lock the spring is mounted over the sear and close to the trigger end. In addition, the sear lock matchlock has a hole beneath the rear end of the spring. This is for securing a small stop upon which the sear rests when the trigger is not depressed.

The trigger-lock matchlock from the pit consists of four elements—the lockplate, the sear, the trigger, and the trigger guard—which are all from the same context (JR2H). Since the serpentine, spring, and lock screws are missing, it appears that the lock was purposefully disassembled, possibly for repair.

Both of the sear locks are also missing their lock screws. One is complete with serpentine, tumbler, sear and spring (265-JR, JR2L). A lever trigger (JR3BL), which is not attached to the sear arm, probably belongs to this lock. The second sear lock includes a lockplate with serpentine, tumbler, and spring. There are also three lever triggers from the same context (JR2H).

There are two other matchlock parts from the pit: a pan, and pan cover; but since these elements would have been attached to the barrel rather than to the plate it is not known if these elements are part of one of the recovered lockplates or if they represent a sixth matchlock.

Musket Rests

Three musket rests used to steady the aim of the matchlock muskets were recovered from the pit. They are each of similar construction, consisting of a U-shaped fork with curling terminals and a separate ferrule which is secured to the fork's scale tang by an eye screw. From the eye there would have been tied "double stringes...to hang about the arme of the souldier when at anytime he shall have occasion to traile the same" (Gervase

Markham, 1625: *Souldiers Accidence* as quoted in Blackmore: 18). The 1607 De Gheyn drawings of the musketeer depict the soldier dragging his musket rest by this cord as he loads his weapon with powder.

Bullet Molds

Also part of the arms accoutrements are two scissors-type bullet molds. They both have integral sprue cutters which would have been used to cut off the excess casting lead. This is an important step since an unbalanced ball could have an irregular trajectory (Brown: 13). The molds would have cast balls of 15 and 17 mm in diameter. Balls of this size would have been loaded into the barrel of the firearm and fired one at a time. Shot, classified as smaller than 10mm in diameter, could be loaded by the handful and usually in varying sizes. It is obvious that the colonists also had a gang mold for this smaller shot, as evidenced by the large number of lead shot with mold seams and by the casting runner found in the pit with four shot still attached, all of different sizes (221-JR). Gang molds are rarely found archaeologically. This may be explained by the fact that they were often made of breakable slate or soapstone (Peterson: 243).

Bullet mold for casting a single lead ball and a scourer for cleaning a musket barrel.



Scourer

Another firearms accessory recovered from the pit is the scourer (JR2H) which was needed to keep the weapon clean and in working order. The head of this tool is divided into three blades: the central straight one flanked by two angled blades to “loosen and scrape encrusted fouling and lead residue” (Brown: 13) from the inside of the barrel. The example from the pit has a socket for insertion of the scouring rod. There is a rectangular attachment slot at the side, which suggests that it was carried attached to the scouring rod. Later examples, such as those illustrated in Wallhausen’s *Kreigkunst zu Fuss* and the one excavated from c.1620-22 Martin’s Hundred, have a screw attachment. With this construction, the same rod could be used for the worm and the scourer. The scourer would have fit a weapon with a 22 mm diameter bore.

Shot

A total of 264 lead shot, measuring 10 mm or under, and 36 lead balls over 10 mm were excavated from the pit. A table of the quantities by diameter for each can be seen below. Diameter measurements are a much more accurate way of analyzing the lead balls and shot, as weights can be impacted by “distortions in shape, air bubbles, and possibly the purity of the lead used” (Ellis: 159).

The shot ranges in size between 1 mm and 10 mm in diameter with the most numerous measuring 5 mm (37%). The varying sizes are found together in the same contexts, suggesting that the shot was not sorted by size prior to loading in the weapon. The small shot is also known as birdshot or quail shot and was commonly used for hunting fowl and other small game. Once fired from the gun, the numerous shot would scatter widely, increasing the chances of hitting the mark. According to the documentary record, this spray of shot also was used effectively by the colonists against attacking “Salvages.” The early weapons provided minimal accuracy and therefore a scatter of shot, hitting some individuals and scaring the rest, and had a greater impact than a single ball shot off the mark. This practice is reflected in an account of 1607, when a group of sixty or seventy Native Americans armed with “Clubs, Targets, Bowes, and Arrows” charged John Smith and his party of six men. The colonists repelled them with “muskets loaden with Pistoll shot,” leaving those who

could not flee into the woods “to lay sprauling on the ground.” (Barbour: II, 144)

As mentioned in the discussion of the bullet mold, much of the lead shot exhibits mold seams and/or casting sprue, indicating that it was produced using gang molds. There is also evidence, however, that some shot may have been created by a process widely used in Europe from the 14th–18th centuries. The basic procedure entailed pouring molten lead through a copper strainer into a pail of water. Writing of this procedure in the late 17th century, German Prince Rupert cautions that as “long as you observe the right temper of the heat, the Lead will constantly drop into very round shot, without so much as one with a tail in many pounds.” If the shot “fall to be round and without tails, there is Auripigmentum (arsenic trisulphide) enough put in and the temper of the heat is right” (Quoted in Brown: 64-65). One of these problems encountered in making shot was probably behind the fifty-nine pieces of shot with “tails” that were recovered from the pit.

The larger lead balls for loading singly into the barrel range in size from 11 to 20 mm in diameter, with 15mm (31%) being the most common dimension. It is not known if these balls were being cast for use in muskets, calivers, or pistols for “the calibre of seventeenth-century guns was far from standardised despite repeated attempts to impose uniform standards” (Ellis: 159). It is most

Figure 3: Shot size by mm.

Size (mm)	Number	% of Total	Size (mm)	Number	% of Total
1	3	1	11	1	3
2	34	13	12	2	5
3	34	13	13	5	14
4	32	12	14	4	11
5	98	37	15	11	31
6	28	11	16	3	8
7	24	9	17	0	0
8	7	3	18	3	8
9	2	1	19	2	5
10	2	1	20	5	14

likely, however, that the smaller sizes were for use in the calivers and pistols.

There is a single example of what was probably once wired shot. It is a 15 mm ball with a hole drilled through it. The hole was for threading the ball to another one using twisted copper wire.⁶ A large quantity of wired shot was recovered during excavations of the Dutch 1629 shipwreck *Batavia* (Green: 71). Wired shot was made with the intention to cause wounds that would severely maim, if not kill, the enemy. There is other evidence that the colonists were mutilating their bullets to cause as much injury as possible. A number of the larger balls are covered with human tooth marks. Similar marks were found on lead balls from the late 16th-century Spanish fort, San Felipe (South: 55). These are probably not from wounded men “biting the bullet” to stifle their screams, but a step taken by the bullet makers to ensure that a dirty wound is inflicted on the intended target (James D. Lavin 1996, pers. comm.). These mangled projectiles would tear up the skin much more than a smooth ball, causing a wound that would take longer to heal. On the other hand, the bite marks may be explained by the sheer boredom of soldiers on watch. It was common military practice to keep bullets in the mouth to expedite loading the firearm after each firing. Strachey’s *Marshall Laws* for

the colony in 1612 describes this custom when he stipulates that the sentinel,

...shall shoulder his peice, both ends of his match being alight and his peice charged, and prined, and bullets in his mouth, there to stand with a careful and waking eye, until such time as his corporall shall relieve him.

Strachey 1612a

Bandolier Cylinders

At least six bandolier cylinders were recovered from the pit. Consisting of thin, sheet iron tapering tubes with one open end, each would have contained the gunpowder for one charge. Bandolier cylinders are more commonly made of wood and were suspended, usually in groups of twelve, from a broad leather strap known as a bandolier which was worn over one shoulder and across the chest. They would each have had caps with ear-like projections through which strings from the bandolier were fitted to allow the caps to easily slide up and down, opening and closing the cylinders. Although no documentary reference has been found for the use of lead for these caps, large numbers of lead caps have been found on archaeological sites from the first half of the 17th century.⁷ One of these lead caps has been found by *Jamestown Rediscovery*,

Sheet iron bandolier cylinders and lead cap. The narrow necked cylinder on the right may have been used for priming the pan.



but from a second quarter 17th-century feature. One of the cylinders from the pit has a very tapered top, the opening of which has been jammed with lead which may be a piece of shot. This cylinder may have served as the priming flask, containing finer powder for the priming pan of the firearm.

Bullet Bag

A separate bag, worn on the bandolier or suspended from a waist belt, would have held the musket balls prior to loading the firearm. The frame from one of these bullet bags was recovered from the pit. It contains iron rivets for the attachment of the leather bag and has an iron buckle on a spring permitting quick release of the bag from its belt. A parallel has not been found for this type of quick release bullet bag among English collections, but a 1548 painting by Titian appears to depict Charles V of Spain wearing one on a waist belt.⁸

Light Artillery

Cast iron-shot first appeared in the beginning of the 15th century. Its efficiency over other projectiles, coupled with improvements in gunpowder, led to the development of small strong guns that could be easily transported. (Manucy: 5).

Three of the four shot recovered from the pit are 2.5" in diameter and weigh approximately 2.5 pounds while the fourth shot is smaller at 2" in diameter and a weight of 1 pound. It is difficult to give a name to the type of artillery that would have fired this shot, for few early ordnance lists agree. It is possible that the large balls are from a small can-

non known as a falcon, whereas the small one could be from a falconet. John Smith mentions twenty-four pieces of ordnance in the rebuilt fort of 1608, including "Culvering, Demiculvering, Sacar and Falcon" (Barbour: II, 325). All these guns, except the falcon, have a much larger bore than is reflected in the shot from the pit.

Edged Weaponry

Scottish Swords

The pommels to five Scottish swords were recovered from the pit. Consisting of thick iron disks with large square brass buttons, this type of pommel has been found on basket-hilted rapiers and daggers attributed to late 16th- early 17th-century Lowland Scots (Blair: 221-233).

Three of the disks are 5 cm in diameter, the other two are 4.6 and 4.2 cm. All the disks exhibit a 0.8 cm diameter hole on the surface and a 1.2 x 0.6 or 1.2 x 0.9 cm slot on the underside for the fitting of the blade. Only one of the disks has its button in place, secured by a fragment of the blade tang. There are four loose buttons which suggest that the pommels were purposefully removed, perhaps to reuse or replace the blades. All the disks are notched on one edge and the smallest disk has an additional 0.7 cm diameter hole. The latter is probably for the attachment of the upper end of the basket guard.

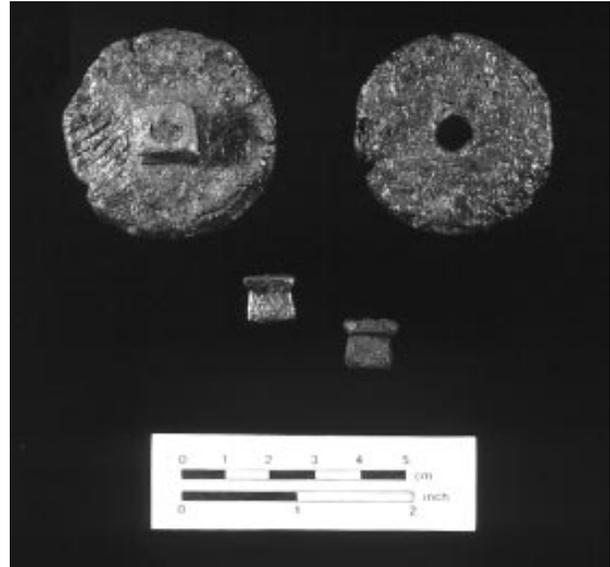


Bullet bag frame with quick release buckle.

These weapons are extremely rare and only a few examples are known in England and Scotland. A single basket guard belonging to this type of rapier was excavated from the c.1618-25 fort site at Flowerdew Hundred in nearby Prince George County. The Jordan's Point tract of land in the same county yielded two of the distinctive disc pommel buttons. These artifacts, coupled with the 1592 and 1593 dates on two of the English blades with these guards, place manufacture and use of these weapons in the late 16th and early 17th centuries.

Sword Buckles and Hangers

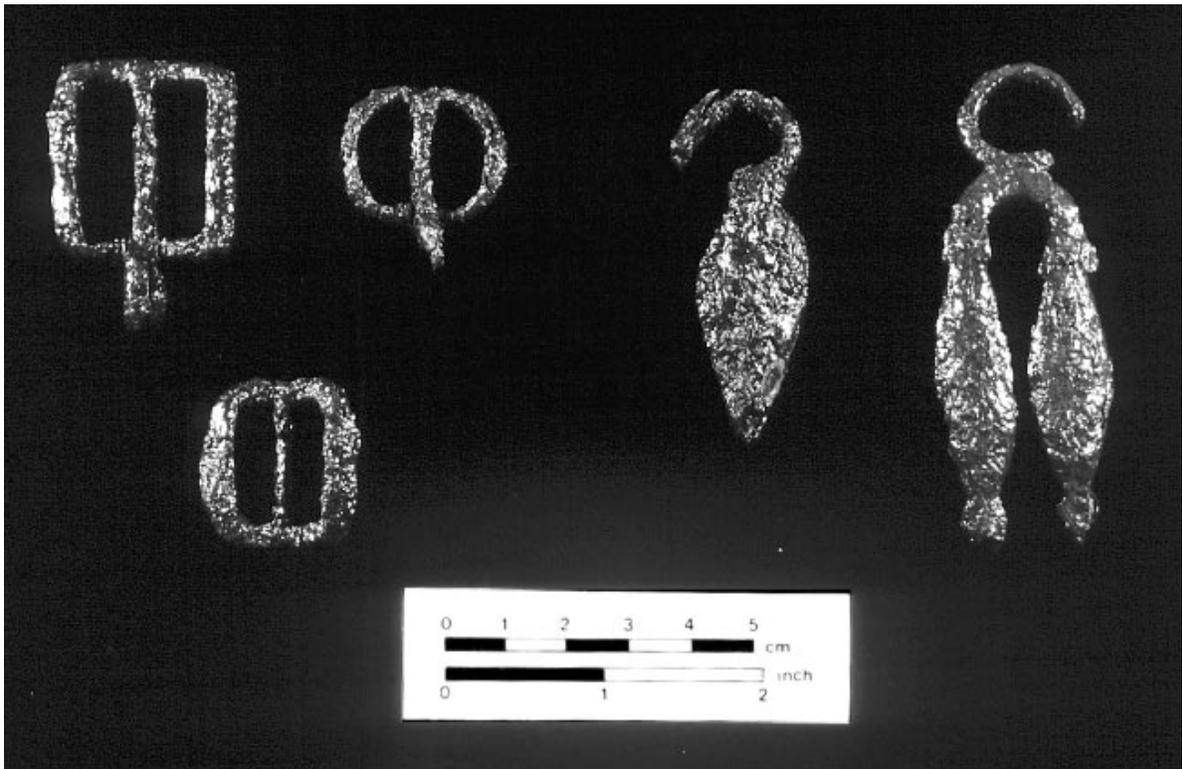
From the second half of the 16th century to the mid-17th century, a sword belt, known as a hanger, was used to house the scabbard. It was a sling-like apparatus which was hooked to a waist belt and was held together with a number of straps and buckles. The hanger held the sword at a 45 degree angle, thereby keeping it from scraping the ground. By examining the hanger strap ends one can determine if the hanger was made for a civilian sword or was of military issue. Civilian hangers



Iron disc pommels and brass buttons from Lowland Scottish swords.

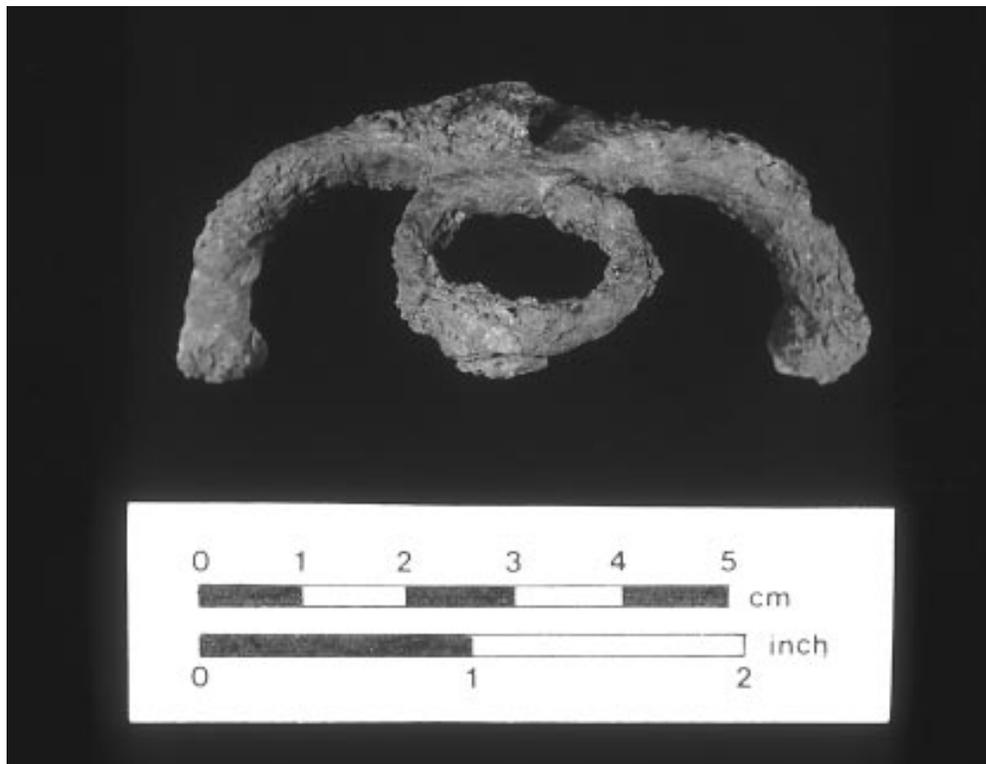
Lowland Scots dagger dating to the late 16th or early 17th century. Courtesy of Museum of London (c196/799).





Buckles, strap end, and fastening from a sword belt hanger.

Left-hand dagger hilt.





Pike heads.

were provided with quick-release hooks so the scabbard could be taken off without removing the sword belt.

A number of these buckles, strap ends, and fasteners for the sword hanger were found in the pit. Not all appear to be of military issue.

Dagger

A hilt to a left-hand dagger with downturned quillons and a side-ring⁹ was among the edged weaponry in the pit. Daggers were edged weapons with short, pointed blades. They were sometimes made *en suite* with rapiers and the two weapons were used in sword and dagger play. “As the skill of the fencing masters grew in the second quarter of the sixteenth century, one of the styles developed was rapier and dagger play in which the combatant held a rapier in his right hand and a short dagger in his left” (Reid: 123).

Daggers were carried as part of civilian dress until about 1630 when they fell out of fashion, as seen in a quote from 1639:

I have fitted myselfe to the times, in speaking onely of single Rapier and single Sword, being that the Dagger, Gauntlet, Buckler are not in use

G.A (1639) Pallas Armata, The gentlemen armorie, Fol. A1v. London quoted in Norman: 289.

Militarily, “the dagger was used by all ranks well into the seventeenth century, when it was supplemented by the bayonet” (Karcheski: 82).

Pikes

The pike was an important infantry weapon for a very long time, its use only declining at the end of the 17th century when it was replaced by the bayonet. Pikemen formed the bulk of the foot soldiers in the Dutch army and were the highest paid of the non-commissioned officers (Kist: 29). The pike was the most effective defense against the cavalry, and pikemen had a special role in protecting the musketeers (those soldiers who were equipped with muskets) while they were reloading their weapons (Tarassuk and Blair: 367).

The iron heads to two pikes were recovered from the pit. They are both socketed and would have been secured to a wooden shaft, approximately 16' long, by two long straps or langets which also served to strengthen the pike (David Blackmore: 75).

The two heads are not of the broad lozenge shape seen in Dutch sources, but instead have four-sided, diamond-shaped heads which are knopped at the juncture of the head and the socket. That both types were probably used in the early 17th century is suggested by a 1643 inventory of weapons in the Tower of London, which lists Dutch pikes with "flatt heads and long English pikes with square heads" (David Blackmore: 76).

Armor

Perfectly usable pieces of armor are often found in early 17th-century trash pits on Tidewater sites. The main reason for this may be explained by the extreme temperatures encountered by the soldiers in the Virginia climate. For the armor to be effective protection, it had to be worn by the soldier whenever there was a threat of danger. In the early years of the colony, this was constantly making it very uncomfortable to perform routine tasks, such as hunting or cutting wood. In addition, the heavy body protection was a detriment when involved in skirmishes with the Native Americans. John Smith alludes to the advantage the Indians had because they were not encumbered with armor:

for the Salvages are so light and swift, though we see them (being so loaded with armour) they have much advantage of us though they be cowards.

Barbour, II, 311

High mortality rates in the colony during the first half of the 17th century could also help to explain the pattern of armor disposal. There was literally a surplus of armor, which was more useful to the colonists cut up and used as scrap to make and repair tools and other objects. After the Indian uprising in 1622, which resulted in the massacre of over 300 men, women, and children, there was a renewed effort to armor the colonists.

A few pieces of plate armor were excavated from the pit, including an element from cuirassier or three-quarter suit of armor. Known as a cowter, it is an elbow protection piece. "The cuirassier was

the heavy cavalryman of the seventeenth century" (Karcheski: 35). It is not known how many horses may have been in the colony during the first three years of settlement,¹⁰ but it is doubtful that there would have been an organized cavalry.

Helmets

Evidence for two types of helmet, the cabasset and the burgonet, were found in the pit. Both are light helmets which could be worn while aiming a firearm. The cabasset helmet is complete and represents the first intact helmet found on Jamestown Island.¹¹ Cabasset, from the Spanish word *capacete* meaning "little cap," was a helmet used in the 16th and early 17th centuries by light cavalry and infantry soldiers. The helmet is constructed of two pieces which are overlapped and joined by riveting and hammering. There is a row of holes just above the narrow brim which would have held rivets securing a band of leather to which the helmet lining would be stitched.

Like the cabasset helmet, the burgonet is a light, open helmet worn by both cavalry and infantry. It is characterized by a comb on the center of the skull and a brim over the eyes, and is usually equipped with neck protection. The burgonet was also fitted with hinged cheekpieces, and this is the only element of the helmet that was found in the pit. The cheekpiece (351-JR) has a rolled and roped edge along the cheek and chin edge and is pierced with five ventilation holes in a diamond arrangement.

Brigandines and Jack of Plates

The brigandine was a relatively light, flexible, vest-like garment consisting of hundreds of overlapping thin iron plates which were riveted to a coarse fabric. It developed in the mid 14th century and gained favor with foot soldiers for the protection it provided without the weight of plate armor (Karcheski: 24). Brigandines for civilian wear were often covered with velvet or other fine colorful cloth. They were not in common usage by the beginning of the 17th century, even though 100 brigandines were supplied to the Virginia colonists from the Tower of London after the Indian uprising of 1622. Even then they were described as being "not only old and much decayed but with their age growne also unfit and of no use for moderne

service” (Virginia Company Records: 503.505).

“Unlike the brigandine, which was worn by all social classes, the jack of plate was essentially the body-defence of the common soldier” (Eaves: 84). Introduced toward the end of 12th century, the jack of plates was constructed of small square or oblong metal plates that were sewn between two layers of fabric. The coat would have resembled a civilian doublet, but the material would have been strong and coarse like canvas or buckram. The jack of plates was cruder than the brigandine and was often constructed of recycled plate armor (Ellis: 63).

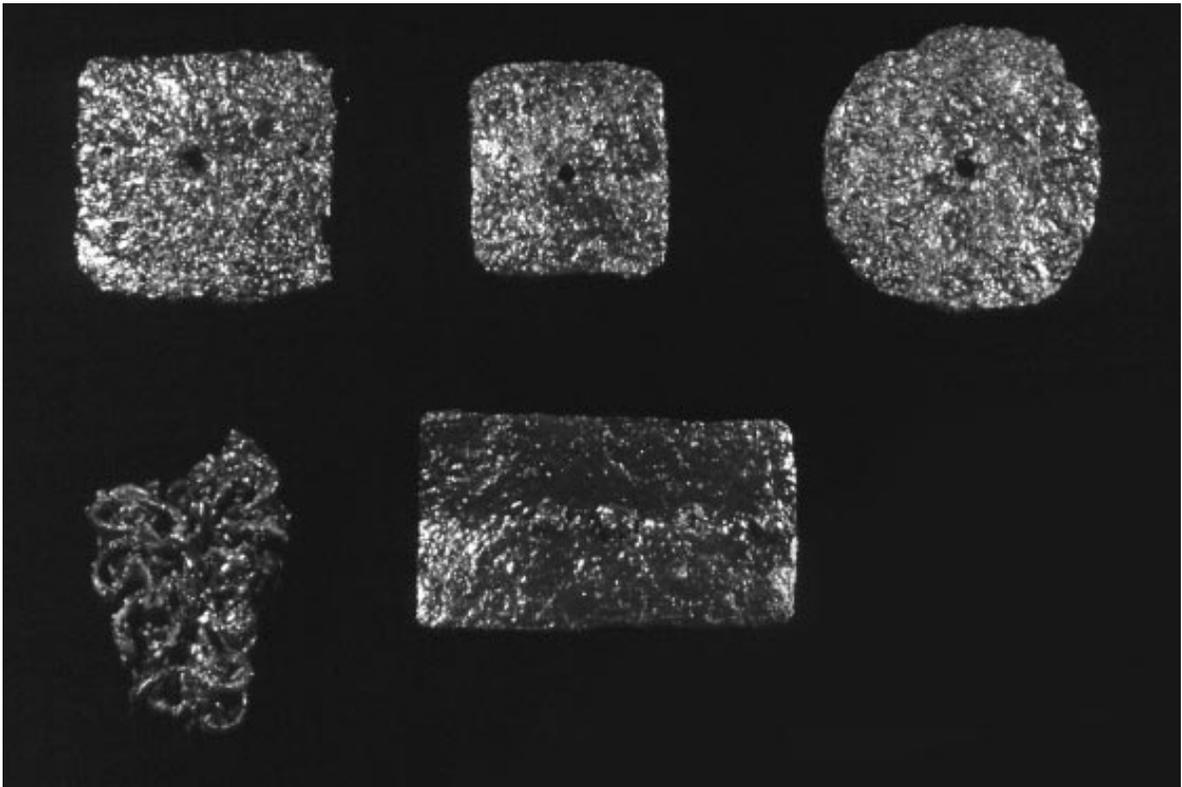
Twenty-six jack plates were found in the pit and more have been recovered from other contexts throughout the site. Over 1,000 plates were required to make a single coat of jack plates. Although there is evidence that coats of jack plates were worn into the 17th century, they must have been old equipment like the brigandines in use at that time, for there is no evidence that coats of jack plates were manufactured beyond the sixteenth century (Ellis: 162).

Chain Mail

Mail is a protective metal fabric composed of interlocking rings. As a flexible yet tightly woven armor, it provided satisfactory resistance to the sharp edges of knives and swords, but little protection against crushing blows or “piercing arms such as spears and crossbow projectiles” (Karcheski: 16). By the 16th century, mail was primarily used as protection in areas that were hard to cover with plate armor, such as the armpits and groin (Karcheski: 16; Norman and Wilson: 21). The chain mail rings were usually made of open-ended wire rings that were secured by pressing or riveting the ends together. Sometimes these rings were alternated with solid rings that had been punched out of sheet metal (Tarassuk and Blair: 342).

Only one concretion of chain mail was found in the pit, but there are numerous concretions from other areas of the site.

Jack plates (left), brigandine plate (top right), and concretion of chain mail.



Significant Individual Artifacts

Thermoscope

Two fragments of what is believed to be an early scientific instrument were excavated from the plowzone over the pit. The instrument is a thermoscope, which is an early temperature-measuring device based on a physical principle first observed by Galileo Galilei. Galileo noted that the density of water changes as its temperature changes. The thermoscope consists of a series of glass balls floating in a liquid-filled glass container. As the temperature of the liquid rises, the balls drop and vice versa (Bruhn).

The thermoscope fragments consist of two lampworked glass figurine parts: the upper torso of an angel and the lower torso of a human figure. While the fragments appear to be made of the same opaque gray glass with surface decay, it is not

known if the two pieces belong to the same object. The hips of the bottom torso are proportionately larger than the chest of the angel, which has been twisted to create the two arms.

The angel, which has golden wings and golden facial features (eyes, eyebrows, ears, and mouth), has a circular pad on the top of its head where it was apparently attached to a glass hook. Extant nineteenth-century examples of thermoscopes produced in France have a series of similar figures suspended from the bottom of floating glass balls. In addition, recent excavations in Amsterdam have uncovered over sixty glass thermoscope figures, some still bearing a glass attachment loop at the top of their heads. These figures were excavated from an early 17th-century context and include glass gondolas, suggesting that they may be Venetian glass (Henkes 1995). It is known that similar figurines were produced in seventeenth-century Amsterdam glass houses, which employed many glassmakers from Venice (Henkes 1994: 320).

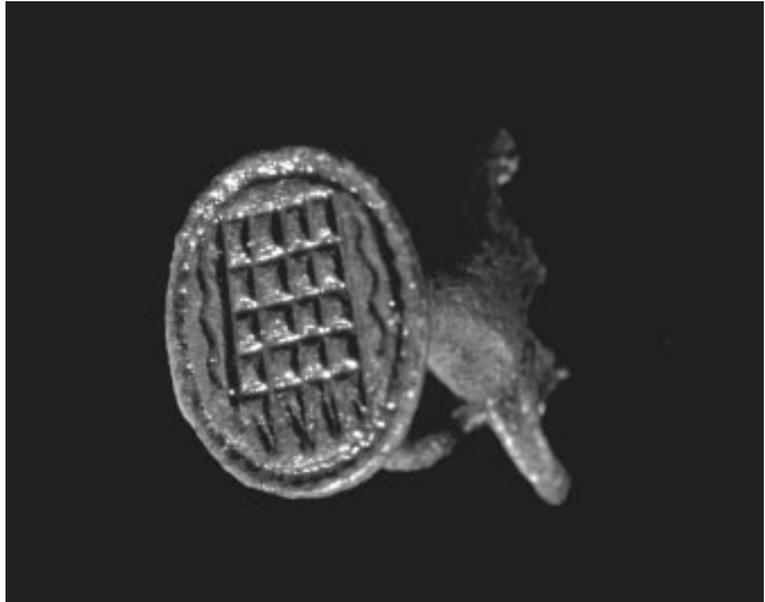
Lampworked glass angel from thermoscope.



Nineteenth-century thermoscope with glass figures suspended from the floating balls.



Wax seal with impression of portcullis.



Research is currently ongoing to determine who among the early colonists would have carried the thermoscope to Virginia. Obviously someone interested in scientific observations, but he would have been hampered by this instrument. The thermoscope would only measure relative temperatures and was only accurate between 18 and 24 degrees centigrade. It would not be too helpful in measuring the extremes of temperatures found in Virginia!

Portcullis Seal Matrix

A copper alloy document seal (JR43A; 102-JR) was found in the plow zone. It consists of an oval matrix with incuse stylized chains on each side of a portcullis. The perimeter is beaded. The balustroidal shank terminates in a bow, which has been bent over, and consists of three central rings topped by a single loop.

Similar seals were found at the c. 1619-1622 Site H at Martin's Hundred (Noël Hume 1982) and at Beeston Castle in Cheshire, England, from a mixed context (Courtney 1993). The Martin's Hundred example consists of a long-necked bird, while the Beeston Castle specimen has a rampant lion. Interestingly, they both have broken bows suggesting that they once hung from a chain or ribbon and were used over a long period of time. Neither seal is believed to be an official insignia.

Seals such as these were used to authenticate documents by stamping an impression on wax. Produced in England since medieval times, they appear to be of two main varieties: those that are made to order bearing inscriptions and/or devices

for a specific office or individual, and those that were sold already engraved (Cherry: 29). Since the Jamestown example has no inscription, it is believed to be one of the latter. These were generic seals that could be obtained by anyone desiring one.

The possibility still remains, however, that the seal is an official stamp. The motif of a portcullis, which is a castle gate and therefore representative of strength and authority, suggests that the seal's user was also imbued with these qualities. Historically, the portcullis is associated with the Tudor family, of which Elizabeth I was a part. The uncrowned portcullis was the insignia of John Beaufort and his heirs, Henry VII and Henry VIII (Pond 1992: 1). Perhaps the portcullis seal is representing the authority of the crown, even though by 1607 the monarch was no longer a Tudor but a Stuart. The portcullis symbol was also traditionally used by HM Customs and Excise. "Apparently, the portcullis came to be regarded as a symbol representing the gates of the Kingdom, that is, the seaports, which were of course, the seats of operation of the Customs" (Pond 1992: 3). It is possible that the owner of the seal was charged with overseeing the commercial activity in the colony.

Finally, it is known that the Wingate family used the portcullis as a crest (H.E. Paston-Bedingfeld, *The College of Arms*, 1996, pers. comm.). Roger Wingate was Treasurer of Virginia in the 1640s, making him a very likely candidate to have once owned the portcullis seal.

Phoenix Token

*As when the Arabian (only) bird doth burne
Her aged bodie in sweet flames to death,
Out of her cinders a new bird hath breath,
In whom the beauties of the first return;
From spicy ashes of the sacred urne
Of our dead phoenix (deere Elizabeth),
A new true phoenix lively flourisheth.*

Sylvester, *Corona Dedicatoria*, prefix to
translation of *Du Bartas* (as quoted in
C.R. Smith: 160)

A leaden token (JR1P, 22-JR) from the pit is similar to a series of tokens found in London which are believed to have been issued in the 1570's.¹² The obverse bears a crowned Tudor rose with ER to the sides and the legend BEATY REGINA (blessed queen). The reverse depicts a crowned phoenix rising out of the flames with the legend SO LA PHOENIX MVN DYE (only the phoenix is pure?).

During her reign, Elizabeth I was associated with the phoenix through poetry, portraiture, and tokens. The phoenix was the mythical Arabian bird of great beauty who was said to live a cycle of 500 years only to burn itself on a funeral pyre and then rise in youth to live through another cycle.¹³ The reason for the association between Elizabeth and the phoenix has been clouded over the centuries and has been variously conjectured in modern times as referring to Elizabeth's efforts to protect her kingdom from the unified Roman Catholic threat or to the hope for her immunity from one of the various plagues ravaging London (Hawkins: 120, 125). Perhaps Elizabeth's self-promotion as

the "Virgin Queen," despite her many alliances, is the reason for her embodiment as a phoenix. The phoenix "commonly symbolizes a love denied bodily consummation, since that would be adulterous or homosexual or politically disruptive, and the love is driven to more spiritual courses" (Empson: 46).¹⁴

A number of lead Elizabethan tokens have been recovered from the foreshore of the Thames in London (Mitchiner: 32). Many of them incorporate features of the token found at Jamestown, but none appear to be identical. Some bearing a phoenix commemorate Elizabeth's accession and are dated 1558 or 1559. Other phoenix tokens, dated 1590-1592, also contain the royal coat of arms. There is another series with a crowned rose and the legend REGINA BEATI.

The purpose of these tokens is not known. Lead tokens were plentiful in Tudor England as the extreme shortage of small change led tavern keepers and shopkeepers to issue a substitute currency to facilitate trade (North: 19). Similar objects were issued as intermediary alms for the poor who, after the Reformation, were no longer taken care of by the Church (Berry: 99-100). Some of the tokens in this series bear the legend CAMERE CO REGIORVM, which means "from the Royal Exchequer chamber" (Geoffrey Egan January 24, 199 pers. comm.), which would suggest that they were official issue from the royal treasury.

Some researchers do not believe these objects are tokens in the sense of a money substitute, suggesting rather that these leaden objects could be jettons, or casting counters, used as tools in calculating. This role, however, was usually filled by the

Obverse and reverse of lead "phoenix token."



brass counters made in Nuremberg and which abound on late 16th- and early 17th-century sites.¹⁵

Finally, because there are many similar tokens that appear to relate to Mary Stuart, it is thought the tokens could be political medalets, issued during Elizabeth's conflicts with the Queen of Scotland to show support for one side or the other (North: 140).

The question remains of why this token was found on the site four years after the death of Elizabeth. Maybe it was used as a gaming token, or perhaps it was carried by a colonist showing his admiration for the monarch who challenged and broke the power of Spain. Finally, it is tempting to associate the token with the ship *Phoenix* which sailed to Jamestown as part of the Virginia colony's First Supply. Could it be a souvenir or good luck piece carried by a crew member from the ship which brought 40 new settlers to Jamestown in April 1608?

Bodkin

The term "bodkin" has been used to define a number of objects with similar shape but of different purpose. It is variously a weapon, a fashion accessory known as a headpin (*hoofdnaalder*), hairpins, or an awl-like tool. "The etymology of the word is obscure, but sharp and needle-like are specifics of meaning" (Cook).

As a weapon, the bodkin is a short double-edged dagger that is sharply pointed and could easily penetrate chain mail or leather. Bodkins were often carried on the inner face of late medieval sword scabbards (Norman: 311). It is probably to the bodkin as a weapon that Shakespeare is referring in Hamlet's famous "To be or not to be" soliloquy: "When he himself his quietus make//With a bare bodkin?"

It is also most likely this small dagger that William Strachey is referencing in 1612. His laws for colonial Virginia record that the second transgression of blasphemy would cause the offender 'to have a bodkin thrust through his tongue.'¹⁶ The military colony at Jamestown would be more likely to mete out justice with a weapon than a sewing tool.

Objects known as bodkins were also used for making eyelet holes in leather and cloth through which the laces which commonly held medieval clothes together were threaded (Cuming). It is possible that a weapon could be used for this purpose, but it is more likely that this function called for a

specific tool. A 1589 reference to "the taylor's bodkin" further supports this.¹⁷

All "bodkins" did not have to be sharply-pointed instruments as illustrated by a late 16th-century reference to the bodkin's role in map making. The bodkin was used to transfer the initial carbon tracing to parchment.

*you shal take a stiele bodkyn or wyre with a smoothe and blunt poynt, that it rase not or bor not the paper: and with it shall you drawe pressyng oppon all the translation, and traceyng it with diligence and discretion.*¹⁸

A slender blunt-ended silver object owned by the Agecroft Association, Richmond, is also identified as a bodkin. Besides being inscribed ("Virtue Passeth Riches"), it is ornately fashioned with a spiral twist and a heart-in-hand terminal.

The Agecroft bodkin, said to date c. 1620, is very similar in appearance to two silver headpins excavated in Amsterdam from early 17th-century contexts. Distinct from a hairpin,¹⁹ Dutch inventories and paintings illustrate that the headpin was a fashionable clothing accessory in the Netherlands c. 1610 to 1630 (Baart et al: 217). The headpin was a flat pin, made of precious or base metal, worn in combination with a raised brim cap decorated on the edge in the form of a little crown. The pin or bodkin was pushed through the pulled-back front hair and secured under the cap. The end of the bodkin projecting from the haircap was often decorated with engraving and openwork. It also contained a hole from which a small pendant

Silver bodkin.



would dangle over the expanse of forehead revealed by the pulled-back hairstyle. It is most likely the Agecroft bodkin is also a headpin. It is highly decorative and even has the slot for the attachment of an ornament.

Two bodkin headpins have been excavated from the site thus far. One is silver and decorated by incising, and the other is brass which has been

silvered. Neither of them is complete, so it is not known if they also had spoon terminals.²⁰ The brass bodkin, which consists of just a fragment, is incised "E S," possibly referring to early colonist Elizabeth Southey.²¹ Both bodkins most likely served as headpins and, as such, are the only artifacts excavated from the site thus far that can be directly related to women.

DISCUSSION

James Fort and the Fourth Ridge

It is important to realize that Jamestown during its first years had a strong military essence and likely resembled an army encampment. The early Jamestown governors and council presidents, Smith, Dale, Gates, Percy, Delaware, all were veterans who served in the Low Countries wars. Accordingly, it is not imprudent to conclude that James Fort was located on the most militarily advantageous part of Jamestown Island. The fourth ridge, where the Jamestown Church, the Confederate Fort, and the current excavations are located, is the highest piece of land on the river side of Jamestown Island. The strategic value of this topography was appreciated in the 19th century by Confederate forces who built an artillery emplacement there, and in the 18th century by American Revolutionary War forces who constructed a chevron gun emplacement on the ridge. It seems reasonable to presume that professional soldiers of the 17th century also recognized the same advantage provided by the fourth ridge.

Further evidence that the fourth ridge is indeed the site of James Fort comes from examining nineteenth-century contour maps of Jamestown Island and recent archaeological testing as part of the assessment of the National Park Service property. The maps and the archaeological fieldwork indicate that there was a large ravine, now filled in, east of the project area (Andrew Edwards 1996, pers. com.). Furthermore, Samuel Yonge's study of Jamestown Island shows that there was a vale, also now filled in, between the Confederate Fort and the Dale House (Yonge: 18-19). Both would have been excellent natural impediments on the east and west sides of the fort, respectively. The James River is an obvious barrier to the south, while the terrain north of the Jamestown Church quickly slopes down to a low area (now a marsh) that would have been an obstacle on this side of the ridge. The report that the fort was built the way it was because "by reason the advantage of the ground doth so require," (Strachey 1612b:79) the conditions of the fourth ridge nicely.

Copper Manufacture

For years historians, archaeologists, and anthropologists have puzzled over a fundamental yet perplexing question about Jamestown, which is, in the words of historian Fred Fausz, "Why did Powhatan and his people allow Jamestown to survive?" (Fausz: 45) Most scholars agree that the Powhatan chiefdom, which encompassed nearly all the Indians of the Virginia Coastal Plain in 1607, could easily have driven the English from their Virginia beachhead during its first struggling years. University of Virginia anthropologist Jeff Hantman has suggested that the answer to Fausz's question is copper, a commodity so valuable to Powhatan that he monopolized it, using copper as gifts and payments for service of his lesser chiefs (Hantman). In 1607, as Hantman points out, the traditional Powhatan source of copper, namely the Monacan Indians, whose territory lay west of the Tidewater Powhatan chiefdom, was cut off due to less than friendly relations between the Monacans and the Powhatans. Accordingly, the English quickly supplanted the Monacans as a source of copper for Powhatan.

The story of copper at Jamestown begins 23 years before the arrival of John Smith in Virginia and 100 miles southeast of Jamestown Island on the Outer Banks of North Carolina. In July 1584, two ships sent by Sir Walter Raleigh, who had a patent to colonize land in North America, arrived at Roanoke Island. Captains Philip Amadas and Arthur Barlowe were on a reconnaissance mission to explore and to evaluate the prospects for establishing a future colony. Instructions for the trip were prepared by Thomas Harriot, one of Raleigh's assistants responsible for tutoring Raleigh and his sea captains in the sciences of astronomy and navigation. Barlowe's account of the expedition contains the following two passages: The first reads,

*We exchanged our tinne dishe for
twentie skinned, woorth twentie Crownes, or
Nobles: and a copper kettle for fiftie skinned
woorth fiftie Crownes. The rest of her women
of the better sorte had pendants of copper,
hangin in every eare, and some of the children
of the Kings brother, and other Noble men,*

have five or six in every eare: he himselfe had upon his head a broad plate of golde, or copper, for being unpolished we knew not what metall it should be,....

Quinn 1991: 101-102

and the second,

... but when Granganimeo, the Kings brother was present, none durst to trade but himselfe, except such as weare redde peeces of copper on their heades, like himselfe: for that is the difference betweene the Noble men and Governors of Countries, and the meaner sort.

Quinn 1991: 103

Based on the enthusiastic report from Barlowe and Amadas, Raleigh proceeded with his first colonizing venture and in June 1585, 108 men under Sir Richard Grenville and Ralph Lane landed at Roanoke Island to establish a permanent English settlement in the New World. Governor Lane subsequently noted in his journal that:

The people naturaaly most curteous & very desirous to have clothes, but especially of course cloth rather than silke, course canuas they also like wel of, but copper carieth ye price of all...

Quinn 1991: 209

Among the soldiers and mariners were two scientists: Joachim Gans, a German metallurgist or "mineral man" as he was called at the time, and Thomas Harriot. Harriot had many duties on this expedition including directing the colony's Indian affairs, numerous scientific tasks, and reporting on the physical and economic assets of the land. When resupply ships did not arrive as scheduled, the Lane colony was abandoned and in July 1586; all the survivors, including Gans and Harriot, returned to England. Shortly thereafter, Harriot wrote his Briefe and True Report of the New Found Land of Virginia, which contains a passage about copper that reads in part:

150 miles into the main in two towns we found with the inhabitants diverse small plates of copper, that had been made as we understood, by the inhabitants that dwell farther into the country, where as they say are mountains and rivers that yield also white grains of Metal, which is to be deemed Silver ... two small pieces of silver grossly beaten about the weight of a Teston {which is a coin}, hanging in the ears of a werowance or chief lord that dwelt about four score miles from us; of whom thorough enquiry, by the number of

days and the way, I learned that it had come to his hands from the same place or near, where I after understood the copper was made and the white grains of metal found. The aforesaid copper we also found by "triall" to hold silver.

Quinn 1991: 332-333

The traditional site of Fort Raleigh is owned by the National Park Service and contains a reconstructed 16th-century earthwork excavated by J.C. Harrington in the 1950s. Archaeological research at Fort Raleigh National Historic Site conducted in the 1990s by the Virginia Company Foundation (VCF) and the National Park Service discovered the remains of a scientific workshop containing evidence of distilling and metallurgy that dates to the 1585 Lane or First Colony (Noël Hume 1994a). The partially preserved scientific workshop floor was located just west of the entrance to the reconstructed earthen fort. More than 100 artifacts were found, consisting principally of crucible sherds, Normandy (or Martincamp) flask sherds, fragments of chemical glassware, worked and unworked copper, antimony (an essential ingredient in separating silver from copper), iron scales, flint chips, and sherds of delftware ointment pots. In fact, the same types of artifacts had been previously recovered from the same area when Harrington excavated a series of test trenches in the 1940s and later the earthen fort in 1950, and in the 1980s by National Park Service archaeologists follow-up fieldwork to a remote sensing survey (Harrington 1964, Ehrenhard and Komara). None of the archaeological projects found domestic refuse such as bones, shells, glass bottles, or ceramics from storing or preparing food. Further, the VCF excavation recovered four sherds of crucibles that contained copper prills or buttons, by-products of assaying copper ore. Collectively, this material plainly points to the distilling experiments of Thomas Harriot and especially the metallurgical work of Joachim Gans when we recall that Harriot wrote in his report on Virginia that some copper was found to contain silver "by means of a triall or assay." Documents definitively state that Harriot and Gans were members of only the Lane Colony and returned to England in 1586.

Subsequent to the failure of the Lane colony, Raleigh dispatched a second colony in 1587 to establish the "Cittie of Raleigh" on the south bank of the Chesapeake Bay. Instead, the 117 men, women, and children were dropped off again at

Roanoke Island; and the settlers subsequently disappeared into history to become the legendary Lost Colony. Although there were no further attempts to establish an English colony until 1607, there were numerous intervening voyages by English mariners to the North Carolina/Virginia coast and the Chesapeake Bay.

One such voyage was made in 1602 by Samuel Mace, an experienced mariner to the New World, who was sent out by Sir Walter Raleigh to obtain samples of tree and plant materials and to determine if any survivors of the 1587 "Lost Colony" settlement could be found. Mace left England in March and sailed to the Outer Banks where he encamped (thought to be in the vicinity of present day Oregon Inlet) for about a month, collecting vegetable products such as roots, leaves, and bark for their possible medicinal value and fragrance (this based on Harriot's previous experience at Roanoke). Thomas Harriot made notes that apparently were a memorandum on the preparations for Mace's voyage. The notes contained the following recommendations for outfitting Mace's journey: "Copper not brasse 20 or 30 pound in plates. Some as thin as paper & small & great."

Apparently, thirty-two pounds of copper plate were obtained for 2 pounds, 2 shillings, 8 pence; and Harriot suggested that it be fashioned into: 10 seven-inch squares and 5 seven-inch circles, 20 six-inch squares and 10 six-inch circles, 40 four-inch squares and 20 four-inch circles, 100 three-inch squares, and 71 pieces "of a smaller size and iblonge and different bignesses," that were apparently fashioned from the scrap leftover from cutting the squares and circles. Along with the copper, Harriot suggested that a pane of glass and punches should be procured, the glass pane apparently serving as a template for cutting the copper plates (Quinn 1977: 432-4).

When Raleigh fell into disfavor and was jailed in 1603, Harriot's role in New World adventures also faded. There is some evidence that he may have had some limited contact or was consulted by Virginia Company of London officials on two minor occasions; however, his experience would be felt for years to come at Jamestown.

Large amounts of small pieces of sheet copper have been found at James Towne from features that almost certainly date to the first 2-3 years of settlement. In fact, 1,418 pieces of scrap copper fragments have been recovered, including seven tu-

bular copper alloy beads. The scrap copper pieces are consistently thin and appear to be cut-offs from sheet copper alloy, rather than from recycled copper alloy objects. Many of the fragments are roughly rectangular with one straight edge and the other slightly curvilinear where it was apparently cut off the sheet. Most of the beads exhibit the same curvilinear edge. A simple sorting of the fragments into different shapes results in groups of small squares (one with a punched hole), rectangular strips, and thin curled pieces. The curled pieces could be the result of trimming plates with shears, much like the curls that are formed by planing wood. There are also several triangular-shaped pieces that surely are the remnants from cutting circles from plates; however, they were not discarded as evidenced by a piece with a hole punched in it. There are a few other pieces that appear to have been intentionally cut into unique shapes. Indeed, a pair of needle-nosed pliers was found in association with the copper and probably was used to make the tubular beads.

There is a marked difference between the copper-related assemblage from Fort Raleigh and that from Jamestown. Unlike the Fort Raleigh specimens, the two beaker-shaped and ten triangular crucibles found in the current project area show no sign of having been used for smelting copper, nor have any copper nuggets been found.

In 1607, Jamestown Island was part of the territory of Paspahugh, one of the tribes within the Powhatan chiefdom. John Smith made several visits to the Paspahugh village, during which he traded, using his words, "pieces of copper" for corn (Barbour: II, 211). Henry Spelman, who left Jamestown to live with the Indians and later had to be ransomed, gives several examples of copper being traded:

... whereupon I was appointed to Joe, which I the more willingly did, by Reason that vitals were scarce with us, caring with me sum Copper and a hatchet which I had gotten. [And] chumming to the great Powetan I presented to him such thinges as I had which he tooke, using me very kindly, [settinge this Savage and me at his oune Table messe] and After I had bin with him about 3. Weekes he sent me backe to our English bidding me tell them, that if they would bring ther ship, sum copper he would fraught hir backe with corne, ... The next day the Powhatan with a

company of Salvages came to Capt Ratcliff, and caried our English to their storehouse where their corne was to traffique with them, giveing them peices of copper and beades and other things According to ye proportions of ye basketts of corne, ... which the Kinge of Patomeck hearringe sent me to him, and I goinge backe agayne brought the Kinge to ye shipe [him], wher Capt: Argoll gave the Kinge [sum] copper for me which he [and he] receyved. Thus was I sett at libertye...

Alexander Brown: 485-488

Part of the Paspahugh village was archaeologically excavated in the 1990s as a consequence of residential development and shoreline stabilization work in that area. Forty-five structures and 21 burials were excavated. One primary and two secondary burials contained copper funerary ornaments; both tubular beads and copper pendants. Local Native American representatives allowed the testing of loose copper ornaments (Hodges and Hodges).

Dr. Stuart Fleming, Scientific Director of MASCA at the University of Pennsylvania, conducted a compositional analysis using proton-induced X-ray emission (PIXE) spectrometry and neutron activation analysis of 31 copper beads and pendants from burials excavated at the Paspahugh village and developed criteria for identification of native versus European copper based on the percentages of arsenic, lead, and antimony contained in the metal (Fleming). He reported that 23 of the objects were made from European copper. Dr. Fleming employed the same techniques in his 1994 analysis of three copper artifacts from Jamestown: a tubular bead, a rectangular off-cut, and a narrow strip off-cut. Dr. Fleming's conclusions on the Jamestown objects are: first, the Jamestown artifacts are not made of native copper; and second, the trace element pattern of Jamestown artifacts is astonishingly similar to the trace element pattern of copper found in the Paspahugh burials.

To sum up, the findings from *Jamestown Rediscovery* make a strong case for something beyond ordinary trade with the Powhatan, which is no surprise; but that the English came prepared to trade, not with European copper objects to be recycled or refurbished by the Indians, but with sheet copper manufactured into beads and pendants specifically for trade with the Indians. Perhaps these were

more valuable to the Indians than a simple "piece of copper." The English-Native American trade in copper in Virginia is currently a topic of vigorous research and more information should be forthcoming in the near future. But it seems that the English learned from their Roanoke experience and Thomas Harriot, and these lessons were translated into a plan employed by the Jamestown colonists. The settlers came prepared, at least on one level, to engage the Powhatans, realizing they would be vital to the survival of Jamestown during its first years.

"Tryal of Glasse"

Prior to the current work by *Jamestown Rediscovery*, the story of glassmaking at Jamestown as told by the documentary record and the National Park Service excavation of the glass furnaces by J.C. Harrington has been limited exclusively to the archaeological site at Glasshouse Point. However, the large quantities of cullet, cobble fragments with glass drippings, and at least two large beaker-shaped crucibles with glass residue found in or nearby Pit I, are persuasive evidence that some level of glassmaking was undertaken in the vicinity of Jamestown Church.

Historical accounts of glassmaking at Jamestown begin with the arrival of Capt. Christopher Newport in October 1608 with the Second Supply which included "eight Dutchmen or Poles" who were glassmakers (Barbour: II, 180-181). Newport returned to England at the end of 1608 with "a tryal of Pitch, Tarre, Glasse..." (Harrington 1972: 10). John Smith also made observations about glassmaking; "No sooner were we landed, but the President dispersed many as were able, some for glasse,...." (Barbour: I, 238) and *Now wee so quietly followed our businesse, that in 3 monthes we made 3 or 4 last of pitch and tarre, and sope ashes, produced a triall of glasse....*

Barbour: I, 263

The best description of the glasshouse was by William Strachey who wrote that the glasshouse was,

a little without the Island where Jamestown stands... where... though the Country wants not for Salsodiack [sodium carbonate] enough to make glasse off, and of which we have made

Copper Compositional Analysis

ID #	Cu	As	Pb	Ni	Sb	Ag	Fe	S	Zn
Assorted Native Sources									
109069-8	97.8	<0.010	<0.031	<0.014	<0.025	<0.016	0.100	1.150	
98641-18	98.1	<0.008	<0.031	<0.018	<0.020	<0.013	0.060	0.810	
75788	99.1	0.130	<0.027	<0.012	<0.022	<0.021	0.050	0.0056	
5209	99.2	<0.009	<0.027	<0.012	<0.023	<0.012	0.051	0.033	
Governor's Land, Native American									
1F57N1	97.7	<0.009	<0.029	<0.015	<0.024	0.037	0.125	0.046	
1F57N2	99.0	<0.011	<0.034	<0.017	<0.026	0.067	0.037	<0.0098	
1F57N16	99.0	<0.008	<0.026	0.022	<0.021	<0.013	0.029	0.039	
1G1	99.3	<0.007	<0.021	0.025	<0.014	0.029	0.080	0.082	
1G2B	98.2	<0.010	<0.031	<0.015	<0.028	<0.03	0.211	0.111	
12C4G8	98.8	<0.007	<0.024	0.019	<0.018	0.044	0.058	0.321	
12C14E	98.6	<0.013	<0.040	0.024	<0.038	0.038	0.070	0.043	
12C21	98.5	<0.010	<0.035	<0.016	<0.031	<0.016	0.164	0.145	
Governor's Land, European									
1F55H3	98.4	0.073	0.133	0.210	0.318	0.076	0.063	0.039	
1F55H4	96.2	0.090	0.246	0.192	0.536	0.117	0.080	0.201	
1F55H15	97.0	0.083	0.152	0.182	0.362	0.060	0.055	0.201	
1F55H19	98.0	0.085	0.117	0.175	0.381	0.078	0.119	0.046	
1F55H22	98.2	0.092	0.306	0.131	0.296	0.049	0.029	0.057	
1F56S3	96.6	0.811	1.440	0.058	0.102	0.033	0.044	0.093	
1F56S6	96.6	0.731	0.868	0.074	0.061	0.040	0.218	0.117	
1F56S8	97.7	0.070	0.155	0.159	0.278	0.071	0.088	0.041	
1F56S15	98.0	0.081	0.401	0.239	0.544	0.081	0.064	<0.0064	
1F57N5	98.7	0.083	0.212	0.126	0.240	0.057	0.087	<0.0057	
9CH6B	96.3	0.980	0.814	0.126	0.699	0.287	0.096	0.010	
9CH6F	96.2	0.600	0.552	0.105	0.373	0.277	0.556	0.071	
12C7	98.7	0.057	0.142	0.183	0.259	0.045	0.062	<.009	
12C8	98.3	0.080	0.216	0.208	0.360	0.059	0.093	0.106	
12C9	98.0	0.059	0.177	0.167	0.322	0.061	0.070	0.063	
12C10B	97.9	0.076	0.332	0.169	0.439	0.065	0.072	<.0069	
12C11	98.3	0.088	0.213	0.179	0.449	0.093	0.054	0.026	
12C12A	97.1	0.066	0.206	0.192	0.357	0.065	0.185	0.055	
12C12C	97.4	0.060	0.326	0.171	0.386	0.049	0.081	0.042	
12C13C	97.8	0.097	0.156	0.152	0.331	0.058	0.057	0.117	
12C17	98.1	0.110	0.375	0.175	0.484	0.075	0.067	<.0086	
Jamestown, European									
JR 1PA	98.4	0.063	0.180	0.170	0.190	0.104	0.091		<0.61
JR 1PB	98.1	0.060	0.290	0.210	0.290	0.076	0.082		<0.62
JR 1PD	98.1	0.350	0.420	0.160	<0.027	0.064	0.074		<0.58

some store in a goodlie howse, sett up for the same purpose, with all offices and furnances thereto belonging, a little without the Island where James towne standes. . .

Strachey 1612b: 78

John Smith also noted that the glasshouse was “a place in the woods neere a myle from James Towne” where he had a fight with and took prisoner the king of the Paspahugh in spring of 1609 as he was returning alone from the glasshouse (Barbour: I, 259-260). After 1609, there is no further reference to the glasshouse or glassmakers until the arrival of six Italian glassmakers for a second attempt in 1621, which endured several setbacks and ended in 1624.

Harrington’s 1948 excavations at Glasshouse Point uncovered four furnaces, a clay pit, a cullet pile, and a well (Harrington 1972). The cullet pile consisted of broken glass objects, drippings, and other refuse from glassmaking (but apparently, unlike *Jamestown Rediscovery*, no crown glass waste). No glass beads or tubes for making beads were found. Aside from the major excavation of the glasshouse, there is only one other archaeological occurrence suggestive of glassmaking. The digging of a trench in 1938 between the church and the river for installing utilities unearthed two fused crucibles (one had been used as a lid) and “field stones used in the construction of the glass furnace” (Noël Hume 1994b: 428-429).

The artifact assemblage from the Glasshouse Point excavations contrasts sharply to the glassmaking artifacts recovered during *Jamestown Rediscovery*. Three beaker-shaped and nine triangular-shaped crucibles have been found in the project area, two fused beaker-shaped crucibles came from the previously noted utility trench, and the rest from the current excavations. Harrington discovered only the large flat-bottomed melting pot crucibles at the glasshouse. The glasshouse also produced a very distinctive type of slag, a buff colored, light, porous material. Not a single piece of this type of slag has been found during the current excavations. Finally, the cullet from the two sites also is completely different. The glasshouse cullet consists mostly of glass nuggets and drippings, while the *Jamestown Rediscovery* cullet is entirely bull’s eyes, rim fragments, and flat body pieces of crown glass.

The overview, then, is that the written record asserts that the first glassmakers arrive in

October 1608, a trial of glass is sent to England in December 1608, and the earliest reference to the off-island glasshouse is in 1609; thus glassmaking took place somewhere in 1608 and not at the glasshouse. The archaeological evidence indicates that there was undocumented glassmaking taking place inside or near the fort. This, in turn, raises two possible interpretations: either the glassmaking operations withdrew into the fort during or after the starving time of the winter of 1609-1610; or that trials of glass were made inside the fort prior to the construction of the furnaces at Glasshouse Point to determine whether glass could successfully be made at James Towne before investing in the building of a permanent glasshouse.

English-Paspahugh Interactions

In 1607, Jamestown Island was part of the territory of Paspahugh, one of the districts within the Powhatan chiefdom. Documentary and archaeological evidence demonstrates that the Paspahugh inhabited Jamestown Island seasonally, and both the 1612 Map of Virginia by John Smith and the 1608 Zuniga Map depict the location of Paspahugh villages at the confluence of the James and Chickahominy rivers, a distance of some four miles from Jamestown Island. At the time of contact, the Paspahughs were lead by a werowance named Wowinchapuncke. John Smith and William Strachey reported that the Paspahugh had 40 warriors, and one researcher has estimated that the total Paspahugh population was about 240 (Turner: 52).

It is quite possible that May of 1607 was not the first meeting between the Paspahugh and Europeans; other Powhatan tribes definitely had earlier encounters with Europeans. A French ship entered the Chesapeake Bay in 1546 and was met by more than 30 canoes, each with 15-20 Indians, who traded 1,000 animal skins to the French for shirts, fish hooks, and knives (Quinn 1974: 190). There were numerous visits by Spanish explorers to the Chesapeake Bay: in 1561 a ship commanded by Pedro Menendez de Aviles sailed into the Chesapeake Bay and left with the young son of the local chief (Quinn 1977: 239); a 1588 voyage under Vicente Gonzalez (Quinn 1977: 302); and per-

haps most significantly, the short-lived Spanish Jesuit mission of 1570 that was established somewhere in present day James City or York County (Lewis and Loomie). Pre-Jamestown English voyages to the Chesapeake Bay occurred in 1584 when a ship of the Barlowe-Amadas reconnaissance to Roanoke Island entered Chesapeake Bay and may have had a hostile encounter with some Native Americans (Quinn 1974: 256-57); in 1585 when a party of the Lane Colony at Roanoke Island spent the winter at a Native American (likely Chesapeake) village while exploring the area (Quinn 1977: 332); and in 1602 by Samuel Mace, who likely made several earlier voyages to Virginia for Sir Walter Raleigh, as well as a 1603 expedition when Humphrey Gilbert and three sailors were killed by Indians on the Eastern Shore of Virginia (Quinn 1977: 432-433).

The initial engagement of the first Jamestown colonists and the Paspahegh at their village on May 4 was friendly, and the English were received "...with much welcome..." (Percy: 12-13). The Paspahegh, with Wowinchopunck, visited the English on May 18 and again on May 20; both meetings ended with unfriendly incidents. Sometime between May 21-28, the Paspahegh with other local Indians, initiated a series of raids that continued until late June when Powhatan ordered them halted (Rountree 1990: 30-36). By the fall of 1607, John Smith made three trips to the Paspahegh village to trade for corn. Indian harassment resumed in the spring of 1608 when the English conducted military drills outside the fort. An alleged theft of tools by the Paspahegh precipitated a dispute in which hostages

were taken by both sides in the winter of 1608. The Indians became reluctant to trade corn (perhaps trying to starve them out), so English used more force to obtain food. Intermittent small-scale raiding continued until the spring of 1609 (Rountree 1990: 43). John Smith captured Wowinchopunck returning from the glasshouse; but Wowinchopunck escaped and Smith retaliated by seizing prisoners, killing others, and burning houses. A truce was made with the Indians in the summer of 1609, but the truce ended in the fall when English dispersed the Jamestown settlers, which the Indians perceived as a threat, and renewed hostilities (Rountree 1990: 51-53). Lord De La Warr arrived at Jamestown in June 1610 intent on resolving the Paspahegh problem and subsequently issued an ultimatum to Powhatan offering peace or war and demanding return of arms and prisoners. Powhatan replied that the English should limit settlement to Jamestown or depart the country. De La Warr responded by appointing George Percy as Chief Commander, and on August 9, 1610, Percy and 70 men launched a devastating attack on the Paspahegh village. The English killed at least 16 Paspahegh, burned their houses, cut down their corn, and captured and later executed the Paspahegh queen and her children. The final blow was Wowinchopunck's death in a raid on Jamestown in February 1611. The Paspaheghs soon abandoned their land to join other groups, and subsequent use of the word Paspahegh in English accounts refers only to their former land, suggesting that the Paspahegh no longer existed (Rountree 1990: 53-55).

Notes

¹ An account of Virginia in the 1580s recorded that "Captain Richard Greville [Grenville] found that the inhabitants did use some pipes made of clay. The English returning from whence brought the like pipes with them to drink the smoak of tobacco and since that time they have caused many such pipes to be made" (De L'Ecluse "Exoticorum Libri Decum" as quoted in Oswald 1975: 4).

² In the early 17th century, one would have to smoke 25 pipefuls to finish an ounce of tobacco (Dunhill).

³ Matchcord consisted of a loosely twisted rope of hemp or flax, about the thickness of a man's little finger. Soaked in a solution of potassium nitrate, it smoldered at a rate of up to a centimeter a minute. This rate is doubled because the match was usually lighted on both ends as a precautionary measure. In addition, since the match was often kept burning even when the musket was not being fired, match cord had to be supplied in enormous quantities in relation to gunpowder and lead.

⁴ Both trigger locks and sear locks formed part of a shipment of arms from England to its army in Ireland in 1601. The entry reads: "Musketts of iij foote Dim in length furnished with restes & moulds only 200 whereof 100 wth Tricker locks at xvjs. [16 shillings] ye peece and 100 with Seare at xv. [15 shillings] the peece" (WO 55/1752 as cited in Blackmore: 17-18).

⁵ A 1631 list of gunmakers rates gives the price for "furnishing a setting of a tricker lock in place of a sceare [sear] lock" as 2 shillings 6 pence (Brown: 393).

⁶ Two examples with the wire intact were recovered from JR4B (204-JR).

⁷ Scores have been found on English and early Virginia sites such Martin's Hundred, c.1618-25 (n=4), The Maine, c.1618-1625 (n=6), and St. Mary's City, c.1640-1665 (n=4).

⁸ "Charles V at the Battle of Muhlberg", Museo del Prado, Madrid.

⁹ The earliest depiction of a side-ring on a left-hand dagger is 1560, and by 1600 this feature is standard (Norman: 288).

¹⁰ At least three horse teeth were part of the faunal collection from the pit. The colonists are recorded as eating "the very skinnes" of their horses during the starving time (Barbour II: 32).

¹¹ An intact helmet was found in a second quarter of the 17th-century context on property now forming the Kingsmill housing development, and another one was located during excavations at The Maine, dating c. 1618-1625.

¹² A second token of the same series has recently been excavated from the plowzone of the site (JR42A, 89-JR). It depicts a rose and double-headed eagle.

¹³ A portrait of Queen Elizabeth I in the National Portrait Gallery, London, by Nicolas Hilliard (c. 1575) is called the "phoenix portrait" because she is wearing a jewel in the form of a phoenix on the bodice of her gown.

¹⁴ A poem written by William Shakespeare entitled *The Phoenix and the Turtle* was published in 1601 just after the execution of Robert Devereaux, the Earl of Essex. It appears to allude to the unhappy plight of Essex as a result of his association with Elizabeth.

¹⁵ For every Elizabethan token found on the Thames foreshore, there are five to ten Nuremberg jettons (Mitchiner: 29).

¹⁶ William Strachey (1612) *Lawes Divine, Morall and Martiall, &c. for the Colony Virginea Britannia*. Many thanks to Drs. B.J. and M.I. Sokol for bringing this reference to our attention.

¹⁷ "Wee challenge him with all Weapons from the taylors bodkin to the watchman's brown bil" (Pappe with an Hatchet ascribed to J. Lylely or to T. Nach 1589, Oxford English Dictionary).

¹⁸ Martin Cortes (1561) *Arte of Navigation*, Folio lviii. Carter Brown Library, New York. Our appreciation goes to Robert D. Hicks for making

us aware of this practice and for bringing this citation to our attention.

¹⁹ A portrait by Rembrandt of Catharina Hooghsaet depicts a hairpin which is probably the precursor of the headpin (Hasselt et. al. : 438). Bodkins as hairpins rather than headpins are seen in the literature as early as 1580: 'A bodkine or big needle to crest the heares" (John Baret An alvearie or triple (quadruple) dictionarie, 1573, 1580 v B785, *Oxford English Dictionary*). These references even continue into the 19th century as seen in Sir Walter Scott's useage in 1820: "She undid from her locks a silver bodkin around which they were twisted" (The Monastery. xvii, *Oxford English Dictionary*).

²⁰ The two Amsterdam bodkins have small spoon-like terminals similar to instruments known as ear spoons, which were used to remove ear wax. Perhaps some bodkins were used for this purpose.

²¹ Elizabeth Southey arrived in The Southampton in 1623 with her husband Henry, a "Somersetshire gentleman" and her 6 children. She was widowed that same year and moved onto property owned by Mr. Buck, the second minister sent by the Virginia Company (Annie Lash Jester, Adventurers of Purse and Person Virginia 1607-1625, 1964, p. 310).

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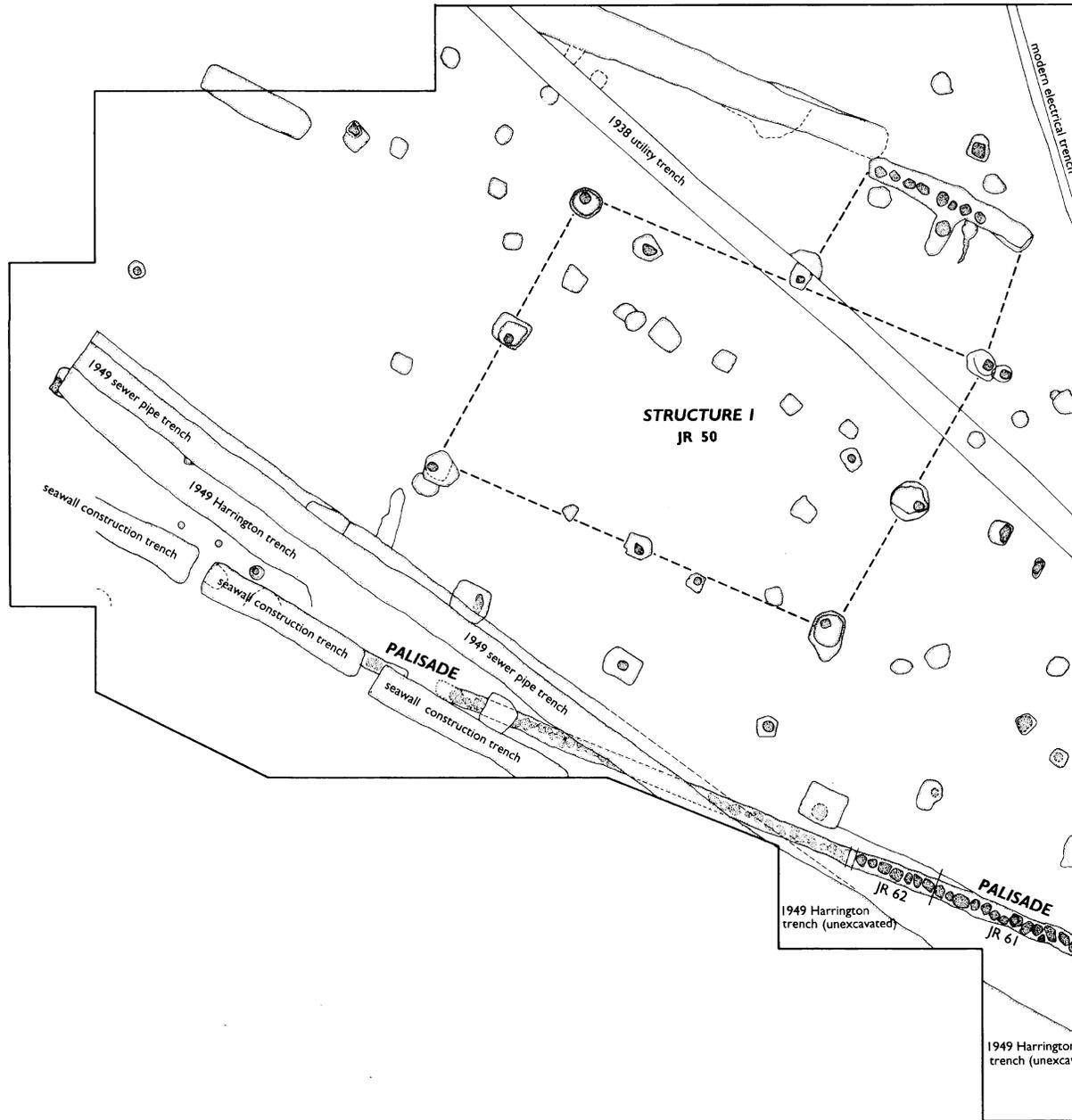
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APVA Jamestown Rediscovery

Site Plan

May 1994-December 1995

